



NewGenPower

**Marine Environment Temperature Elevation Plan (METEMP)
Final Diffuser Location and Design Management Plan (FDLADMP)
Stack Emissions Monitoring Plan (SEMP)
Greenhouse Gas Abatement Program (GGAP)**

Annual Compliance Report 2023
NewGen Power Kwinana Pty Ltd

Department: Health, Safety & Environment

Document History

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1 Introduction

The NewGen Kwinana Power Station (NPK) is a 320MW nominal capacity combined cycle gas turbine (CCGT) power station that has been in commercial operation by NPK since October 2008. The premises are located on the shore of Cockburn Sound in the northern end of the Kwinana Industrial Area. Directly to the east of the site is more heavy industry and Rockingham Road. On the eastern side of Rockingham Road are light industries and residential areas. The plant comprises a 170 MWe gas turbine unit, an 80MWe heat recovery steam generator and steam turbine with an additional 80MWe available from supplementary (or duct) firing, providing a total nominal capacity of 330 MWe. The main air emissions from the plant are oxides of nitrogen. The plant is fuelled by natural gas from the North-West Shelf, which is processed through low NO_x burners.

As a component of the Ministerial Statement 698 approved in 2005, a series of management plans were required to be prepared and approved by the Environmental Protection Authority. These include:

- Marine Environmental Temperature Management Plan (METEMP)
- Final Diffuser Location and Design Environmental Management Plan (FDLADMP)
- Stack Emissions Monitoring Plan (SEMP)
- Greenhouse Gas Abatement Plan (GGAP)

A commitment in the above plans requires the proponent to submit compliance reports to the regulator on an annual basis.

This combined report serves to meet the annual compliance requirement of the METEMP, FDLADMP, SEMP and GGAP. The reporting period is from 10th October 2022 to 9th October 2023.

2 Marine Environmental Temperature Management Plan (METEMP)

2.1 Summary

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Marine Environment Temperature Elevation Plan (METEMP) and maintain compliance with Ministerial Statement 698.

The METEMP has Key Management Actions that need to be reported against as outlined in Section 2.2. Other items to note in the 2022/23 (10th October 2022 – 9th October 2023) reporting period include:

- There were 0 instances where the temperature elevation was greater than 14.1°C daily average.
- There were 195 instances where the temperature elevation was greater than 9.5°C daily average.
- Currently, updated version of METEMP is pending approval by DWER. This is expected to be finalised before the end of the next reporting period.
- An annual audit of the plan was undertaken which recorded positive outcomes. This is available upon request.

2.2 Statement of Compliance

There are a range of Key Management Actions and a series of commitments contained within the METEMP that NPK must adhere to ensure compliance is maintained with MS 698. Table 2.1 outlines those actions contained within the METEMP and a summary of the status of the actions for the reporting period.

Table 2.1: Key management action table

METEMP Condition	Timing/Phase	Key Management Actions	DWER Reporting Evidence	Status
METEMP 1	During Commissioning	Monitor diffuser performance against model predictions.	Result submitted to OEPA in post commissioning compliance report.	Complete.
METEMP2	Post Commissioning	Monitor seasonal temperatures as described on S7.3.	Results submitted in post commissioning compliance report	Complete.
METEMP3	All phases	Implement a complaints management process.	Results summarized in Annual Report	Compliant. Nil complaints received.
METEMP4	Post Commissioning	Monitor maximum instantaneous and daily average temperature elevations.	Report exceedances or faults within 24 hrs.	Compliant. Nil recorded.
METEMP5	Post commissioning	Investigate potential exceedances of EQG for temperature.	Results submitted to DWER within 7 days of final investigation and verification studies.	Compliant. No exceedances recorded.

2.2.1 METEMP 1

The seawater outlet diffuser performance validation was completed in Nov 2023 (Report available upon request). The diffuser performance validation analysis indicated that the NewGen diffuser was achieving a higher dilution of cooling water on the 13 November 2023 than predicted by pre-construction modelling. This was consistent with the findings of previous surveys done in 2009, 2010,

2012, 2014 and 2018. This is required every five years and the next diffuser validation is scheduled to be carried out in the 2028 period.

2.2.2 METEMP 2

The diffuser performance was monitored during the commissioning of the station. In addition to this, seasonal water quality monitoring (i.e. water temperature) was undertaken for the first five years of operation of the plant and compared to criteria of the State Environmental (Cockburn Sound) Policy 20015. At all times NPK was found to be complaint and as a result this is no longer required, provided the cooling water outfall remain in place as per Section 5.1 of the METEMP.

As per DWER request, Seasonal water quality monitoring was completed for the period of August 2021 to August 2022. All 4 quarterly seasonal results showed that EQGs were met for the monitoring period. In meeting the EQG, there is a high degree of certainty that the associated environmental quality objective (EQO) has been achieved (as per EPA 2005). The full report can be provided on request.

2.2.3 METEMP 3

No complaints have been received during the reporting period.

2.2.4 METEMP 4

Ministerial Condition 6-9 requires that upper limits of instantaneous and daily average cooling water temperature elevation above ambient are specified. The upper limit for instantaneous cooling water temperature elevation is specified at 27.1°C whilst the maximum daily average cooling water temperature elevation is specified at 14.1°C. These temperature values represent the highest discharge values given abnormal operating conditions, such as the unusual event that one cooling water pump goes out of operation and the remaining pump has its inlet screen blocked. However, during normal operation the upper limit for instantaneous cooling water temperature elevation is specified at 13.1°C, whilst the maximum daily average cooling water temperature elevation is specified at 9.5°C.

Table 2.2 shows the monthly averages of the temperature elevation of the cooling water released to Cockburn Sound. Figure 2.1 shows the distribution of the daily average temperatures across the reporting period.

In this reporting period, there were 195 instances of temperature high than daily average of 9.5°C. There were no exceedances of the abnormal limit.

Currently, the updated version of METEMP is pending approval by DWER. This is expected to be finalized before the end of the next reporting period.

Table 2.2: Monthly temperature delta average

Month	Cooling Water Daily dT - Monthly Average (°C)	Days Exceeded 9.5°C dT Average (Internal Exceedance)	Days Exceeded 14.1°C dT Average (External Reporting Incident)
October (From 10th)	Plant outage	0	0
November	Plant outage	0	0
December	10.8	14	0
January	7.9	4	0
February	8.5	10	0
March	8.6	8	0

April	9.7	18	0
May	10.5	29	0
June	11.6	29	0
July	10.9	28	0
August	11.3	28	0
September	10.8	25	0
October (Until 9th)	4.5	2	0
YEARLY AVE	10.1		
TOTAL DAYS ABOVE 9.5°C		195	0

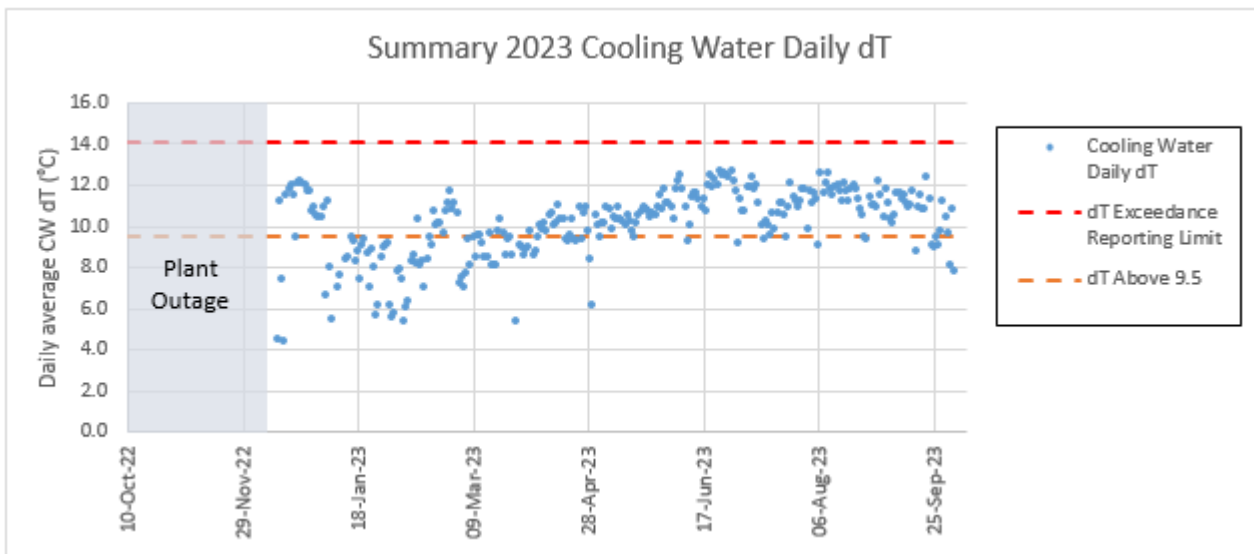


Figure 2.1: Daily average discharge temperature

2.2.5 METEMP 5

During the reporting period there has been no exceedances of the Cockburn Sound Environmental Quality Guideline (EQG) for temperature. Due to the no exceedances there has not been any investigation or verification studies conducted in the reporting period.

3 Final Diffuser Location and Design Management Plan (FDLADMP)

3.1 Summary

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Final Diffuser Location and Design Management Plan (FDLADMP) and maintain compliance with Ministerial Statement 698.

The FDLADMP has Key Management Actions that need to be reported against as outlined in Section 3.2. Maintenance and inspection requirements of the diffusers have been undertaken throughout the reporting period. An annual audit of the plan was undertaken which recorded positive outcomes. This is available upon request.

3.2 Statement of Compliance

The Final Diffuser Location and Design Management Plan (FDLADMP) has been compiled to meet the broad requirements of Ministerial Statement 698.

The FDLADMP discusses the results of modelling to predict performance of the outfall system measured against the relevant Cockburn Sound Environmental Quality Criteria (EQCs) and likely effects on adjacent intake/outfall systems.

There are a range of Key Management Actions and a series of commitments contained within the FDLADMP that NPK must adhere to which have been summarised in the Table 3.1 and discussed further in Sections 3.2.1 to 3.2.6.

Table 3.1: Key management action table

FDLADMP Reference	Timing/Phase	Key Management Actions	DWER Reporting Evidence	Status
FDLADMP1	During commissioning	Monitor diffuser performance against model prediction.	Result submitted to DWER in post-commissioning compliance report.	Completed in 2023. This activity is to be repeated in 2028.
FDLADMP2	Post-commissioning	Monitor seasonal temperatures as described in METEMP.	Result submitted to DWER in post-commissioning compliance report.	Complete.
FDLADMP3	Post-commissioning	Evaluate use of satellite thermal imaging of sea surface temperatures for confirming modeling predictions.	Result submitted to DWER in post-commissioning compliance report.	Complete.
FDLADMP4	Post-commissioning	Develop a monitoring and dosing program for chlorine in conjunction with Synergy.	Results summarised in Annual Report required under Part V Licensing requirements.	Complete.
FDLADMP5	Ongoing	Investigate potential exceedances of EQG for temperature.	Results submitted to DWER within 7 days of final investigation and verification studies.	Complete, no exceedances in reporting period.
FDLADMP6	Ongoing	Preventative maintenance of diffuser to prevent fouling by marine organisms.	Complete maintenance log, logged data available on request.	Compliant. Ongoing.

3.2.1 FDLADMP 1

In December 2013, Oceanica conducted the annual diffuser performance validation on behalf of NPK. This report has been provided previously and therefore remains compliant.

The conclusion of the investigation indicated that the pre-construction modelling under-predicted the thermal and water quality dilution performance of the diffuser. Hence, the diffuser is achieving greater dilution performance than predicted.

The interpretation of the upper limits for thermal discharge have been finalised with the OEPA (now DWER) and incorporated in the METEMP. There is now no requirement to carry this out on an annual basis.

As per Section 7.2 of the METEMP “diffuser modelling is to be carried out every 5 years”. This was completed in Nov 2023. The diffuser performance validation analysis indicated that the NewGen diffuser was achieving a higher dilution of cooling water on the 13 November 2023 than predicted by pre-construction modelling. Report was submitted to DWER. It is anticipated that the modelling will be next carried out in 2028.

3.2.2 FDLADMP 2

Oceanica completed seasonal METEMP reviews in 2014 by undertaking an analysis of the water temperature data collected in the period 1 December 2013 to 31 September 2014. The information contained through this period indicated that the EQGs were met for the 2012/13 Summer, Spring, Autumn and Winter monitoring periods. In meeting the EQG, there is a high degree of certainty that the associated Environmental Quality Objective (EQO) had been achieved (as per EPA 2005). After significant amendments to the METEMP these reviews are no longer required.

The report relating to this monitoring has been provided to the regulator as provided to DWER in previous annual reports. This requirement remains compliant.

3.2.3 FDLADMP 3

The diffuser validation report was completed in Nov 2023 which showed diffusers were achieving greater dilution than the model.

3.2.4 FDLADMP 4

In September 2009, NPK engaged Oceanica to develop a Chlorine Risk Assessment and Management Plan. The report indicated that neither acute nor sub-lethal chronic effects are expected at the boundary of the low environmental protection zone, due primarily to the high dilution efficiency of the diffuser and the low levels of chlorine dosed. The report has previously been provided to DWER.

Chlorine monitoring data will continue to be reported in the Annual reporting requirements of the NPK Part V Environmental Licence L8271/2008/1.

3.2.5 FDLADMP 5

In the reporting period there has been no verified exceedances of the EQG for temperature and as such no investigation or verification studies have been conducted to date.

3.2.6 FDLADMP 6

NPK maintains a diffuser inspection log. The diffusers were inspected in the 2022/23 reporting period in Feb 2023, May 2023 and Sept 2023. The works were carried out by Fremantle Commercial Diving Pty Ltd (FCD) and the associated reports can be provided on request.

4 Stack Emissions Monitoring Plan (SEMP)

4.1 Summary

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Stack Emissions Monitoring Plan (SEMP) and maintain compliance with Ministerial Statement 698. The SEMP has Key Management Actions that need to be reported against as outlined in Section 4.2.

EKTIMO completed two stack emissions compliance tests required under Environmental Licence L8271/2008/1 in Dec 2022 and June 2023.

There were no exceedances of NO_x and no complaints were received over the reporting period. All scheduled maintenance were undertaken during the reporting period.

As per section 9 of the SEMP, an annual audit of the plan was undertaken which recorded positive outcomes. This is available upon request.

An updated version of the SEMP has been approved by DWER in Feb 2022. Further details is described in Section 4.2.

4.2 Statement of Compliance

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Stack Emissions Monitoring Plan (SEMP) as described in Section 13 of the SEMP (2014) and the miscellaneous commitments contained within the plan. This is detailed in Table 4.1.

Table 4.1: Key management action table

SEMP Condition	Timing/Phase	Key Management Actions	DWER Reporting Evidence	Status
SEMP 1	Post Commissioning	Monitor exhaust emissions from the exhaust stack as specified in SEMP s7.1.	Result submitted to OEPA in post commissioning compliance report.	Compliant. Results submitted in post emission compliance report.
SEMP 2	Ongoing	Monitor NO _x emissions from the exhaust stack as specified in SEMP s7.1.	NO _x continually monitored and recorded; can be submitted on request.	Compliant. Results submitted in this annual report.
SEMP 3	Ongoing	Monitor power plant parameters as specified in s7.2.	Summarise performance in annual report, logged data available on request.	Compliant. Results submitted in this annual report.
SEMP 4	Ongoing	Monitor and respond to community complaints, record actions as specified in s7.3.	Summarise performance in annual report, logged data available on request.	Compliant. No complaints received.
SEMP 5	Annual	Monitor carbon monoxide, VOCs and other stack parameters as specified in s7.1.	Summarise performance in annual report, logged data available on request.	Compliant. Results submitted in this annual report.
SEMP 6	Annual	Prepare annual compliance report.	Analyse monitoring results, submit to OEPA with annual report.	Compliant. Results submitted in this annual report.

SEMP 7	Ongoing	Preventative maintenance.	PEMS is now installed. Routine preventative maintenance is carried out in accordance with manufactures rec.	Compliant. Information available on request.
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The original SEMP was approved by the Office of the Environmental Protection Authority (EPA) in 2005 and was then revised in 2014. On 28 June 2017 the Environmental Licence L8271/2008/1 was amended by the removal of condition 2.2.2 which specifies an emission to air target of 70mg/m³ for nitrogen oxides (NOx). Table 1 (Atmospheric emission limits) of the current SEMP states the emission concentration limit for NOx as 70mg/m³.

In Nov 2020, an updated version of the Ministerial Statement 698 was approved. In this updated version, the NOx emissions limit has now been changed to 31ppmv (64mg/m³) for gas turbine above switchover and 60ppmv (123mg/m³) for gas turbine below switchover. The SEMP has been updated to reflect these new reports and is the latest version has been approved by DWER in Feb 2022.

4.2.1 SEMP 1

This requirement is deemed compliant as results were submitted to the regulator in a post commissioning compliance report.

4.2.2 SEMP 2

NOx is continuously monitored via PEMS against the approved limits of 64mg/m³ for gas turbine above switchover and 123mg/m³ for gas turbine below switchover. In the reporting duration of this report, the limit was adhered to. Figures 4.1 and 4.2 shows the NOx data against limit during the different modes.

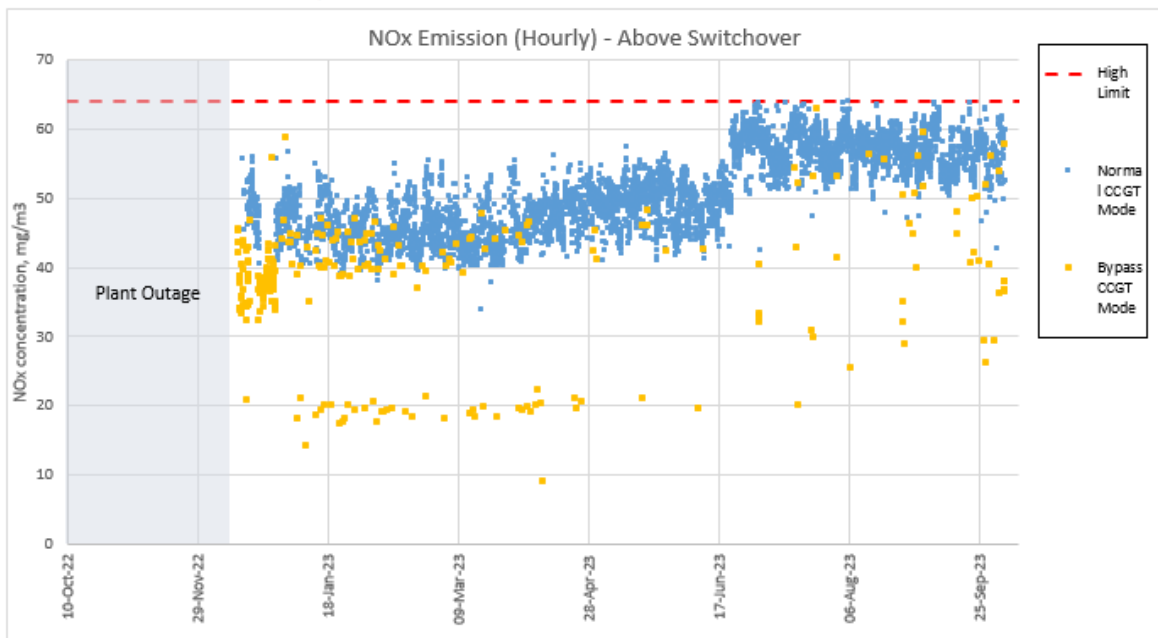


Figure 4.1: NOx hourly average above switchover

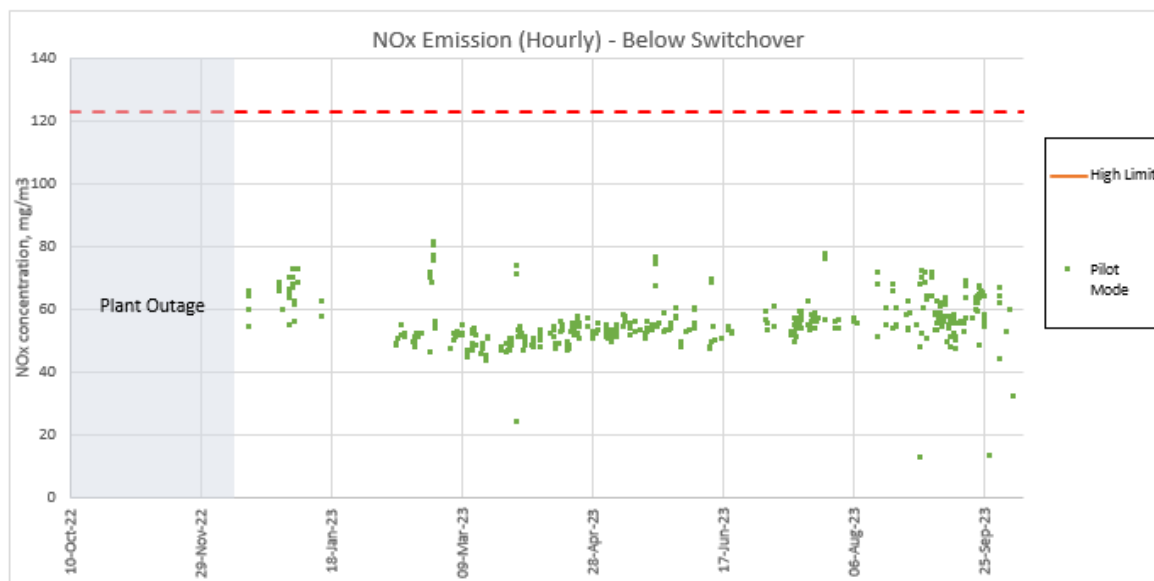


Figure 4.2: NOx hourly average below switchover

Monitoring of NOx remains in the NPK Environmental Licence L8271/2008/1 (condition 3.2.1) and the results will continue to be reported through the Part V reporting requirements of Environmental Licence L8271/2008/1, Condition 4.2.1 and the SEMP.

4.2.3 SEMP 3

NPK continuously monitors the operational parameters of the power station in accordance with Alstom' Operations and Maintenance Manual. Operational data is stored on site and can be provided on request.

In summary, the operational data does not present anything abnormal for the reporting period. At all times, one operator is at the panel monitoring the operational conditions of the power station. As the fuel source properties remain constant throughout the year there is very little variation in operational parameters.

4.2.4 SEMP 4

No complaints were received over the reporting period.

4.2.5 SEMP 5

EKTIMO carried out the sampling and analysis of stack parameters as specified in Section 4 of the SEMP in Dec 2022 and June 2023. NOx is measured using PEMS (method USEPA PS-16) and results are summarised in Section 4.22. This supports the compliance requirements of Ministerial Statement 698, the SEMP and the Environmental Licence (L8271/2008/1).

The results of the emission test can be found in Table 4.2. The full suite of results and the Relative Accuracy Audit can be provided on request.

Table 4.2: Emission values

Parameter	Units	SEMP Limits	Stack Sample Dec 2022	Stack Sample June 2023
Velocity	m/s	-	18	19
Temperature	C	-	102	109

Vol Flow Rate	m ³ /s	-	517	533
Moisture Content	%	-	8.4	5.8
Dry Gas Density	kg/m ³	-	1.31	1.30
Molecular Weight (wet)	g/gmol	-	28.4	28.6
Carbon Dioxide	%	-	3.8	3.1
Carbon Monoxide	mg/m ³	63	59	9.2
Volatile Organic Compounds	mg/m ³	20	N/A	< 0.02

Monitoring of NO_x remains in the NPK Environmental Licence L8271/2008/1 (condition 3.2.1) and the results will continue to be reported through the Part V reporting requirements of Environmental Licence L8271/2008/1, Condition 4.2.1 and the SEMP.

4.2.6 SEMP 6

This annual report satisfies commitment SEMP 6.

4.2.7 SEMP 7

Routine preventative maintenance is carried out in accordance with manufactures recommendations. Maintenance tasks are automatically generated and carried out by staff through the site computerised maintenance system (CMMS). This information is available on request. Maintenance undertaken as required by Rockwell are part of PEMS maintenance contract.

5 Greenhouse Gas Abatement Program (GGAP)

5.1 Summary

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Greenhouse Gas Abatement Program (GGAP Section 14) and maintain compliance with Ministerial Statement 698. The GGAP has Key Management Actions that need to be reported against as outlined in Section 5.2.

Following is a summary of the key activities carried out relating to the program for the reporting period:

- Greenhouse gas emissions have been calculated and reported in accordance with NGERs legislation;
- NPK has reviewed and implemented where practical a number of “no regrets” and “beyond no regrets” measures to reduce greenhouse gas emissions;
- Estimation and reporting of the “greenhouse efficiency” of the project per unit of product is continuing on an ongoing basis;
- There is a continual process of seeking out operational efficiencies within the plant.
- An annual audit of the plan was undertaken which recorded positive outcomes. This is available upon request.
- An updated version of the GGAP is pending approval by DWER.

5.2 Statement of Compliance

NewGen Power Kwinana Pty Ltd (NPK) complies with the requirements of the Greenhouse Gas Abatement Program (GGAP Section 14) as detailed in Table 5.1. The information in the table is comprised of Conditions listed in Ministerial Statement 698.

Table 5.1: Compliance review table (Section 14 GGAP)

MS 698 Condition	Condition Text	GGAP Section	Status
7-1	Prior to commencement of construction, the proponent shall develop a Greenhouse Gas Abatement Programme to: ensure that the plant is designed and operated in a manner which achieves reductions in “greenhouse gas” emissions as far as practicable	2,5,6,9,10,11,12	Compliant
7-1	Provide for ongoing “greenhouse gas” emissions reductions over time;	5,11	Compliant
7-1	Ensure that through the use of best practice, the total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product from the project are minimised; and	2,5,6,11	Compliant
7-1	Manage “greenhouse gas” emissions in accordance with the <i>Framework Convention on Climate Change 1992</i> , and consistent with the National Greenhouse Strategy to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.	2	Compliant
7-1(1)	Calculation of the “greenhouse gas” emissions associated with the proposal, as advised by the Environmental Protection Authority;	6,8,11	Compliant
7-1(2)	Specific measures to minimise the total net “greenhouse gas” emissions and/or the “greenhouse gas” emissions per unit of product associated with the proposal using a combination of “no regrets” and “beyond no regrets” measures;	5	Compliant
7-1(3)	Consideration of the implementation of “greenhouse gas” offset strategies;	8	Compliant
7-1(4)	Estimation of the “greenhouse gas” efficiency of the project (per unit of product and/or other agreed performance indicators) and comparison with the efficiencies of other comparable projects producing a similar product, both within Australia and overseas;	6	Compliant
7-1(5)	Implementation of thermal efficiency design and operating goals consistent with the Australian Greenhouse Office Technical Efficiency guidelines in design and operational management;	2,5,6,8,11,12	Compliant
7-1(6)	Actions for the monitoring, regular auditing and annual reporting of “greenhouse gas” emissions and emission reduction strategies	8,9,11,12	Compliant

7-1(7)	A target set by the proponent for the progressive reduction of total net “greenhouse gas” emissions and/or “greenhouse gas” emissions per unit of product and as a percentage of total emissions over time, and annual reporting of progress made in achieving this target. Consideration should be given to the use of renewable energy sources such as solar, wind or hydro power;	11	Compliant
7-1(8)	A program to achieve reduction in “greenhouse gas” emissions, consistent with the target referred to in (7) above	5	Compliant
7-1(9)	Entry, whether on a project-specific basis, company-wide arrangement or within an industrial grouping, as appropriate, into the Commonwealth Government’s “Greenhouse Challenge” voluntary cooperative agreement program;	12	Compliant
7-1(10)	Review of practices and available technology	5,10	Compliant
7-1(11)	“Continuous improvement approach” so that advances in technology and potential operational improvements of plant performance are adopted. 5, 1	5,10	Compliant

5.2.1 GGAP MS Condition 7.1

The GGAP was finalised on 12 December 2006 and submitted to the regulator for approval.

5.2.2 GGAP MS Condition 7.1(1)

NPK is gas fired and configured to deliver 320 MW of nominal capacity.

Table 5.2 summarises the key performance indicators for the facility in relation to plant operation, efficiency and emissions. NPK exceeded the Greenhouse Intensity (target) benchmark for the reporting period.

Table 5.2: Key performance indicators

	2008/9	2022/23	Target
Output Factor (%)	41	53	NA
Sent Out Thermal Efficiency (%)	43.4	44.3	44.5
Greenhouse Intensity (kg CO ₂ -e/MWhr)	422	451	438

Section 8 of the GGAP specifies the annual reporting requirements and the results are listed in Table 5.3.

Table 5.3: Monthly emission values

	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Total
Days in Month	31	30	31	31	28	31	30	31	30	31	31	30	365
Fuel Usage (PJ)	0.00	0.00	0.70	0.94	0.99	1.12	1.25	1.41	1.50	1.44	1.48	1.35	12.2
Capacity Factor (%)	0%	0%	30%	47%	55%	58%	67%	74%	81%	75%	77%	71%	52.8%
MWhr Generated	0	0	74674	115555	122724	141327	158307	180796	192473	184165	188037	168749	1526807
MWhr Sent Out	0	0	73308	113875	120881	139176	155391	178233	189936	181610	185456	161828	1499694
MWh Imported	69	216	347	453	250	209	141	15	7	36	40	60	1843
Sent-Out Thermal Efficiency	0.0%	0.0%	37.5%	43.4%	44.1%	44.7%	44.8%	45.4%	45.6%	45.3%	45.1%	43.2%	44.3%
kg CO ₂ -e	0	0	38932786	52295624	54526523	62322920	69449965	78586457	82920652	80151989	82134734	74620780	675942430
Greenhouse Intensity (kg CO ₂ -e/MWhr)	0.000	0.000	531.085	459.237	451.075	447.801	446.937	440.921	436.571	441.341	442.880	461.111	450.720

5.2.3 GGAP MS Condition 7.1(2)

NPK has committed to implementing both ‘no regret’ and ‘beyond no regrets’ measures that are consistent with the Australian Greenhouse Office’s (AGO) Generator Efficiency Standards to minimise greenhouse emissions. It should be noted that the AGO ceased to operate in 2007. The AGO’s responsibilities now sit with other Government agencies.

The following measures have been adopted to meet this requirement:

- Installation of energy efficient lighting. Replaced incandescent lights with LED;
- Installation of energy efficient air-conditioning;
- Routine monitoring of plant efficiency through online plant information indicators;
- Operation of the plant at optimum efficiency in accordance with the manufactures operation and maintenance manuals;
- Follow a routine preventative maintenance and cleaning regime to maintain operation of the power station at optimal efficiency;
- Follow a continuous improvement approach so that advances in technology and potential operational improvement of plant performance are adopted where practical;
- Repair/replace defective components as soon as is practically possible;
- Implementation of a risk based inspection program;
- Upgraded the gas turbine (MXL2) to improve efficiency by approximately 1%.

The plant is operated and maintained according to the OEM manuals, which prescribes the preventative maintenance regime. These tasks are planned and recorded by the site computerised maintenance management system, MEX.

5.2.4 GGAP MS Condition 7.1(3)

As stated in the GGAP (Section 7); “NewGen has considered greenhouse gas offsets and has determined that they will not be implemented at this time.”

5.2.5 GGAP MS Condition 7.1(4)

The greenhouse gas emissions of the facility have been calculated and have been used to generate an estimate of the carbon intensity. The carbon intensity measurements are highlighted in Table 5.4 and indicate that the facility is performing better than best practice as provided in the then AGO Generator Efficiency Standards. Due to the unique configuration of the facility, there is no other comparable Australian plant which can be used to benchmark performance.

Table 5.4: Efficiency of NewGen Kwinana Gas Fire Power Station (% Higher Heating Value HHV Basis)

Plant	Output MW	AGO efficiency standard at ISO conditions (HHV) %	NPK expected efficiency- ISO Conditions- (HHV) %
CCGT	242.5	46.7	48.1
Steam Cycle (duct firing)	82	37.7	39.7
Base Load Hybrid Plant	324.5	na	46.0

5.2.6 GGAP MS Condition 7.1(5)

NPK has monitored current performance and found that the performance of the plant, with the use of the currently employed no-regrets measures is performing above the range required for

a comparable plant. NPK will continue to monitor plant performance for degradation and address those issues as they become apparent.

The thermal efficiency design and operating goals as described in the Australian Greenhouse Office (AGO) Technical Efficiency Guidelines were previously adopted in the design and operational management of the facility.

5.2.7 GGAP MS Condition 7.1(6)

NPK meets all of its reporting obligations under the National Greenhouse Energy Reporting Act 2007.

In order to be compliant with this legislation NPK conducts regular monitoring and reporting of the emissions produced at the facility. This data is reported annually to the Clean Energy Regulator (CER). A copy of the NGER report is available upon request.

The CER identified that NPK Power Kwinana Pty Ltd is the responsible emitter for the purposes of the National Greenhouse and Reporting (Safeguard Mechanism) Rule 2015 (Safeguard Rule).

On the 3rd October 2016 NPK was notified that its reported baseline was 808,183tCO₂-e. This meets the requirements of paragraph 16(1)(a) of the (Safeguard Rule).

Staff maintain an open dialogue with the CER and frequently attend workshops and training seminars on NGERS related matters.

5.2.8 GGAP MS Condition 7.1(7)

In the GGAP, targets for the reduction of greenhouse gas emitted from the facility were established by demonstrating that NPK would maintain the plant in such a way that it would reduce the amount of efficiency loss of the plant. This was predicated on the degradation mechanisms of the plant to a level that over 30 years, the amount of loss would be a total of 1.48 % less than that which would have occurred due to normal degradation mechanisms. This is shown in Table 5.5.

As per Table 5.5, at the end of the 15th year of operation the target and best practice Carbon Intensity was stated to be 0.441 tCO₂-e and 0.444 tCO₂-e respectively. NPK achieved an emission intensity 0.456 tCO₂-e. In mid Dec 2022, the plant came back from a major outage and required a long period of commissioning and startup, resulting in higher CO₂ intensity. It should be noted that the targets in Table 5.5 are estimates. The actual GHG intensity of the powerstation is determined and reported every year and compared with current best practice in accordance with the process and procedures specified by the National Greenhouse and Energy Reporting Act 2007 (NGER Act).

Table 5.5: Greenhouse emission targets

End of Year	Best Practice Carbon Intensity*	Target Carbon Intensity*	Target Change (%)	End of Year	Best Practice Carbon Intensity*	Target Carbon Intensity*	Target Change (%)
1	0.426	0.427	0.30%	16	0.446	0.442	-0.79%
2	0.427	0.428	0.20%	17	0.447	0.443	-0.84%
3	0.429	0.429	0.10%	18	0.448	0.444	-0.89%
4	0.43	0.429	-0.20%	19	0.45	0.446	-0.94%

5	0.431	0.430	-0.25%	20	0.451	0.447	-0.99%
6	0.433	0.431	-0.30%	21	0.453	0.448	-1.04%
7	0.434	0.432	-0.35%	22	0.454	0.449	-1.09%
8	0.435	0.433	-0.40%	23	0.455	0.450	-1.14%
9	0.437	0.435	-0.45%	24	0.457	0.451	-1.19%
10	0.438	0.436	-0.50%	25	0.458	0.452	-1.24%
11	0.439	0.437	-0.55%	26	0.459	0.453	-1.29%
12	0.44	0.438	-0.60%	27	0.461	0.455	-1.34%
13	0.442	0.439	-0.65%	28	0.462	0.456	-1.39%
14	0.443	0.440	-0.70%	29	0.463	0.457	-1.44%
15	0.444	0.441	-0.75%	30	0.465	0.458	-1.48%

* - ton CO₂-e / MWhr

NPK has historically monitored plant efficiency by way of one hour performance tests and this can be readily converted into an emission intensity value. The historic carbon intensity for the facility at part load (171.5 MW), base load (234.4 MW) and base load with duct firing (325.8 MW) is presented in Table 5.6.

Table 5.6: Emission intensity at various load conditions

Net MWhrs	Uncorrected			Corrected		
	Sent out Thermal Efficiency	Carbon Intensity	Heat Rate	Sent out Thermal Efficiency	Corrected Carbon Intensity	Heat Rate
325.8	46.2%	395.7	8020.87	46.2%	396.0	7792.50
234.4	47.6%	384.0	7556.17	47.2%	387.2	7619.36
171.5	44.3%	413.3	8131.10	44.1%	415.0	8165.30

The carbon intensity of the facility at different loads has been corrected for atmospheric conditions such as:

- Cooling water temperature;
- Ambient air temperature, pressure and humidity;
- Grid frequency; and,
- Power Factor;

As per the AGO Technical Efficiency Guidelines, this allows comparison of the carbon intensity over time irrespective of any changes in any of the influencing caveats.

5.2.9 GGAP MS Condition 7.1(8)

NPK is committed to reducing emissions and become more efficient. It does this through a continuous improvement approach by identifying opportunities and then discussing this with internal and external stakeholders. Any identified opportunities are robustly investigated and if deemed appropriate are implemented into the business.

A program is in place to achieve the reduction in “greenhouse gas” emissions consistent with target referred to in the previous section. This program consists of three phases:

- Phase 1 – Identify, develop and record the plant efficiency in a fashion that is consistent and comparable over time irrespective of atmospheric conditions.
- Phase 2 – Monitor plant efficiency against relevant target.
- Phase 3 – Implement integrated asset management techniques to maintain efficiency in line with targets.

If maintenance based measures are not sufficient to meet the required greenhouse reduction targets NPK will consider the most cost-effective ways to achieve the required targets giving specific consideration to the use of renewable energy sources such as solar, wind or hydro power.

5.2.10 GGAP MS Condition 7.1(9)

NPK participated in the Commonwealth Government's Greenhouse Challenge Plus program from November, 2008 to the conclusion of the program in July, 2009.

5.2.11 GGAP MS Condition 7.1(10)

NPK adopted a continuous improvement approach which is described in Section 5 of the GGAP. Technology improvements are being constantly reviewed at a site and management level. Where practical and feasible projects are identified they are implemented. The most recent upgrade included an upgrade to the MXL2 compressor by the installation of new blades. This has increased overall plant thermal efficiency by 1%.

Other projects have been previously provided to DWER through the annual reporting process.

5.2.12 GGAP MS Condition 7.1(11)

NPK has committed to undertake a review every 5 years of state of the art mitigation measures to identify advances in technology and potential operational improvements of plant performance that are relevant for CCGT.

Due to the focus on efficiencies associated with the plant this process is carried out on a continuous basis.

New improvements that are being investigated include:

- The optimisation of plant start-up times;
- Improvement in low load operation;
- Investigations into the operational philosophy of the plant;
- Review of cycle chemistry;
- Investigations into prolonged steam turbine bypass;
- Annual workshops for plant improvement; and
- Asset Performance Management Program.

All investigations are at a preliminary stage. Progress on these items will be provided in future reporting periods.

5.3 Key Recommendation

The requirements of Condition 7 of MS 698 may now not apply to the NPK as greenhouse gas emissions are managed by the Clean Energy Regulator under the National Greenhouse and Energy Reporting Act 2007. On review of the GGAP it was found that many sections are no longer relevant due to changes in legislation and the manner in which greenhouse gasses are regulated by both State and Federal Government agencies. An updated version of the GGAP is pending approval by DWER.