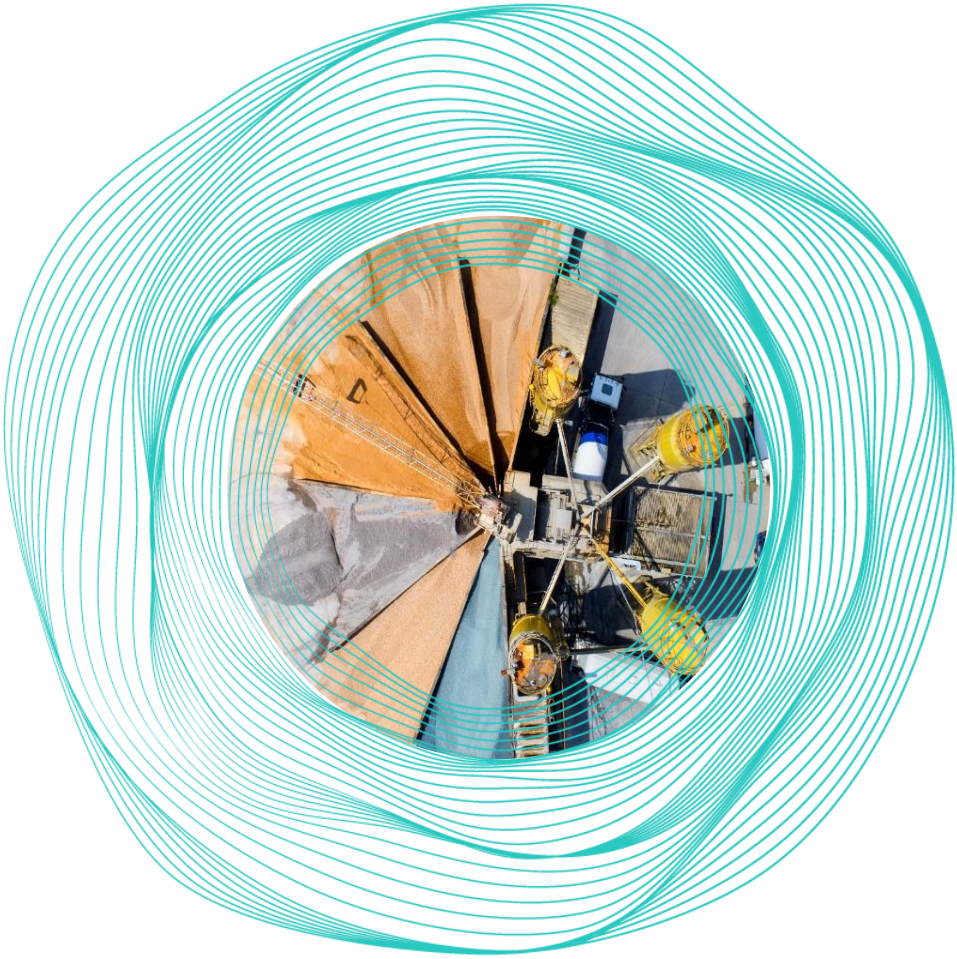
Greenhouse Gas Management Plan

Kemerton Power Station Increased Operation Capacity



23 October 2024

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Abbreviations, acronyms and definitions

Term	Definition
AEMO	Australian Energy Market Operator
Authorised extent	Authorised extent under Ministerial Statement Schedule 2 – amendment 6
CO_2-e	Carbon dioxide equivalent
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EPA	Environmental Protection Authority
FY	Financial Year
GHG	Greenhouse Gas
GHGMP	Greenhouse Gas Management Plan
GWP	Global warming potential
IASR	Inputs, Assumptions and Scenarios Report (AEMO
KPS	Kemerton Power Station
Kt	kilotonne
MS	Ministerial Statement
NDC	Nationally Determined Contribution
NEM	National Electricity Market
NGA	National Greenhouse Accounts
NGER	National Greenhouse and Energy Reporting Scheme
NWIS	North-West Interconnected System
RATCH	RATCH-Australia Kemerton Pty Ltd
RATCH Group	RATCH Group PCL
Scope 1	Scope 1 GHG emissions are those released to the atmosphere as a direct result of an activity, or a series of activities, which are part of a Proposal being considered by the EPA.
Scope 2	Scope 2 GHG emissions are those from the indirect consumption of an energy product by the proposal. E.g. emission from the generation of electricity purchased by the Proposal.
Scope 3	Scope 3 emissions are indirect GHG emissions other than Scope 2 emissions that are generated in the wider community. Scope 3 emissions (both upstream and downstream) occur as a consequence of the activities of a proposal, but from sources not owned or controlled by the proponent as part of the proposal.
SERS	Sectoral Emissions Reduction Strategies
SF_6	Sulphur hexafluoride
SWIS	South-West Interconnected System
WEM	Wholesale Electricity Market
Year	Financial year as defined in the Conditions. All years reflect the financial year ending in the year listed (i.e. 2026 reflects the 2025-2026 financial year).

1. Executive Summary

Table 1—1: Executive summary

Item	Summary
Proposal name	Kemerton Power Station Increased Operating Capacity
Proponent name	RATCH-Australia Kemerton Pty Ltd (RATCH)
Proposal description and scope	The Proposal is to increase the Kemerton Power Station (KPS) hours of operation from 2,000 hours/annum to 13,800 hours/annum. The construction and operation of KPS was approved under Ministerial Statement 645 (published 9 February 2004) and the facility has been operating since 2005. The Proposal represents a significant amendment to the operating quantities/descriptions currently approved under Schedule 1, Attachment 6 of Ministerial Statement 645. The Proposal is limited to increasing the hours of operation of the approved KPS facility and does not involve any clearing, construction, commissioning or development of new equipment or infrastructure.
Purpose of the GHGMP	Greenhouse gas (GHG) emissions associated with the Proposal exceed the Environmental Protection Authority's (EPA) significant impact threshold for GHG emissions (>100,000 tonnes of CO_2-e (t CO_2-e) of Scope 1 GHG emissions, and the Proposal therefore constitutes a 'significant amendment' to Ministerial Statement 645. This GHG management plan (GHGMP) has been developed to support the assessment, approval and implementation of the Proposal under Part IV, Section 38 of the *Environmental Protection Act 1986*. This GHGMP calculates Scope 1, 2 and 3 GHG emissions from the Proposal and identifies management and mitigation measures to ensure impacts from GHG emissions associated with the Proposal are minimised in accordance with the EPAs GHG Factor Guideline.
Emissions estimates	Based on the proposed maximum annual operation of 13,800 hours per year the following maximum emission levels are expected: • Scope 1 – 1,345,130 t CO_2-e per year • Scope 2 – 1,366 t CO_2-e per year • Scope 3 – 102,045 t CO_2-e per year KPS is expected to reach its end of life by 2045. Under a worst-case scenario of the maximum emissions under stated abatement targets, emissions over the lifetime of the proposal would be as follows: • Scope 1 – 21,522,086 t CO_2-e • Scope 2 – 12,786 t CO_2-e • Scope 3 – 2,244,996 t CO_2-e However, it is expected that actual emissions will be lower than these estimates.
Trajectory of emissions reductions	Five-yearly emissions reduction targets of: • 15% reduction on proposed maximum emissions in 2031-2035, over the whole five-year period, reaching 25% reduction by 2035 • 40% reduction on proposed maximum emissions in 2036-2040, over the whole five-year period, reaching 50% reduction by 2040 • 65% reduction on proposed maximum emissions in 2041-2045, over the whole five-year period, reaching 75% reduction by 2045 References to years throughout the document align with financial years as defined in the conditions.

Item	Summary
Other statutory decision-making processes which require reduction in GHG emissions	• NGERS reporting • Safeguard Mechanism • Western Australian Climate Policy • Greenhouse Gas Emissions Policy for Major Projects
Key components in the GHGMP	Key measures adopted to avoid, reduce, and offset Scope 1, 2 and 3 emissions include: • Minimising run-up and run-down times • Wet compression to improve efficiency • Offsets as required to achieve targets outlined in Section 3.2 Additional options for future consideration when and if economic and technical feasibility changes include: • Carbon capture and storage • Converting to combined cycle gas turbine • Blending hydrogen into the feed gas
GHGMP reviews and reporting	Five yearly reviews unless prompted by significant changes in regulations, technology, or market circumstances.
Proposed construction date	N/A
GHGMP required pre-construction	N/A
Proposed project end of life/decommissioning date	Proposed end of life is 2045

2. General proposal scope

2.1 Proposal description

Table 2—1: Proposal description and scope

Item	Description
Proposal name	Kemerton Power Station Increased Operating Capacity
Proponent name	RATCH-Australia Kemerton Pty Ltd (RATCH)
Proposal description and scope	The Proposal is to increase the Kemerton Power Station (KPS) hours of operation from 2,000 hours/annum to 13,800 hours/annum. The construction and operation of KPS was approved under Ministerial Statement 645 (published 9 February 2004) and the facility has been operating since 2005. The Proposal represents a significant amendment to the operating quantities/descriptions currently approved under Schedule 1, Attachment 6 of Ministerial Statement 645. The Proposal is limited to increasing the hours of operation of the approved KPS facility and does not involve any clearing, construction, commissioning or development of new equipment or infrastructure.
Purpose of the GHGMP	Greenhouse gas (GHG) emissions associated with the Proposal exceed the Environmental Protection Authority's (EPA) significant impact threshold for GHG emissions (>100,000 tonnes of CO2 e (t CO2 e) of Scope 1 GHG emissions), and the Proposal therefore constitutes a 'significant amendment' to Ministerial Statement 645. This GHG management plan (GHGMP) has been developed to support the assessment, approval and implementation of the Proposal under Part IV, Section 38 of the Environmental Protection Act 1986. This GHGMP calculates Scope 1, 2 and 3 GHG emissions from the Proposal and identifies management and mitigation measures to ensure impacts from GHG emissions associated with the Proposal are minimised in accordance with the EPAs GHG Factor Guideline.

2.2 Proposal rationale

The South West Interconnected System (SWIS) is undergoing significant changes, including forecast increases in demand on the network, the increase of intermittent renewable electricity generation capacity, and the imminent closure of coal power plants in Western Australia (DPC, 2022).

In 2022 the WA State Government announced that Collie Power Station would be retired in late 2027, and Muja D in late 2029 (DPC, 2022). The Australian Energy Market Operator (AEMO) predicts an increase in expected unserved energy and in the 2023 Wholesale Electricity Market (WEM) *Electricity Statement of Opportunities* highlighted the "urgency" of increasing generation due to planned closures and increasing demand (AEMO, 2023a). The AEMO has highlighted the role of gas generation to support the transition to a majority-renewables system (AEMO, 2023b). Additionally Western Australia's sectoral emissions reduction strategy (SERS) identifies the need for additional back up from gas-fired power generation to provide dispatchable power over the short to medium term, complement batteries and unlock higher concentrations of renewable electricity (DWER, 2023).

Based on these forecasts and recent operating increases at KPS, RATCH is applying to increase the annual maximum approved operation of the KPS from 2,000 hours per year to 13,800 hours per year. The proposed increased operating capacity would provide additional security and stability on the SWIS, and stable, affordable pricing on the WEM.

The direction of Synergy and the AEMO dictate KPS's hours of operation due to contracting arrangements and power generator market obligations. Generation is dependent on many factors including market conditions, electricity and frequency requirements of the SWIS, and the bidding strategies of Synergy and other market participants. As a result, it is difficult to predict annual hours of operation into the future, particularly in the context of the significant forecast growth in renewable generation capacity on the SWIS over the medium to long term (Government of Western Australia, 2023).

While RATCH is applying for an increase in approved operating capacity up to 13,800 hours per year, it does not expect that the KPS will reach this maximum every year, neither does it expect that operation will remain this high into the future. However, due to a lack of visibility into the trajectory of KPS' operation, and particularly a lack of visibility into when renewable capacity on the SWIS will increase to the point of absorbing the impact of the coal closures, RATCH has based this GHGMP on the worst-case scenario of 13,800 hours of operation per year, despite expecting the reality to be significantly lower than this on average. Historically, KPS' annual operating hours and associated GHG emissions have fallen well below the limits approved under MS 645, with the facility having averaged 65kt CO_2-e per year between FY13 and FY22, despite being approved up to 320kt CO_2-e in that period. Because of the nature of the electricity market, operation fluctuates from year to year, so RATCH is applying for the maximum expected operating hours, while expecting to operate at lower rates most years.

3. Emissions calculations

3.1 Emissions estimates

Under the current approved operating capacity, the KPS is permitted to operate at up to 2,000 hours per year, equating to up to 320 kt CO_2-e Scope 1 emissions per year (MS 645 - Schedule 1, Attachment 6). Table 3—1 outlines the current and proposed scope 1 GHG emissions extents for the KPS.

Table 3—1: Maximum annual Scope 1 GHG emissions under previous authorised extent and proposed approval

	Authorised extent[1] (t CO_2-e per annum)	**Proposed** (t CO_2-e per annum)
Annual Scope 1 GHG emissions from authorised/proposed operation limit	320,000	1,345,130

Table 3—2 summarises the expected Scope 1, 2 and 3 emissions of the KPS under the maximum operating conditions of the proposed increased operating extent. Table 3-3 summarises the expected Scope 1, 2 and 3 emissions of KPS under expected operational throughput. These estimates are explained further throughout Section 2.2. Due to the nature of KPS operation as a peaking plant, future expected operational throughput is difficult to predict. As a result, scope 1, 2 and 3 emissions of *expected* operational throughout could not be estimated, and maximum has been used as the most conservative scenario.

Table 3—2: Maximum expected emissions under proposed approval conditions

GHG Emissions Scope	Maximum annual GHG emissions[2] (t CO_2-e)	Maximum lifetime GHG emissions (t CO_2-e)
Scope 1	1,345,130	21,522,086
Scope 2	1,366	12,786
Scope 3	102,045	2,244,996

3.1.1 Scope 1 emissions estimates and methodology

Scope 1 emissions are those that are produced directly from operations. At the KPS, most Scope 1 emissions stem from the combustion of natural gas used to produce electricity for the SWIS. Material Scope 1 emissions sources and their associated emission estimates are provided in Table 3—3. The emissions factors used to calculate these estimates come from the National Greenhouse and Energy Reporting (NGER) Measurement Determination (DCCEEW, 2023a).

[1] Ministerial Statement 645 – Schedule 1, Attachment 6

[2] As of 2024's expected SWIS grid emissions factor

Table 3—3: Scope 1 GHG emission estimates for proposed case under maximum operation (excl. targets)

Scope 1	Source	Activity	NGER emissions factors	Annual emissions (t CO_2-e)	Lifetime emissions (t CO_2-e)
Proposed hours of operation (13,800 hours per year)	Natural gas	Energy generation	0.052 (t CO_2-e/GJ)	1,312,571	28,876,569
	Diesel	Energy generation	0.070 (t CO_2-e/GJ)	32,517	715,366
	Diesel	Vehicles	0.070 (t CO_2-e/GJ)	23	508
	Sulphur hexafluoride (SF_6)	Leakage (switchgear and gas cylinder)	23,500 Global Warming Potential (GWP) 0.0089 standard leakage rate	19	424
Total				1,345,130	29,592,868

Scope 1 emission estimates were calculated using the emissions factors provided by the 2023 Australian National Greenhouse Accounts (NGA) Factors (DCCEEW, 2023a). The emissions factors used are detailed within Table 3—3.

Table 3—4 Outlines the breakdown of the different GHGs accounted for, per the NGA (DCCEEW, 2023a). GHG emissions account for the global warming potential (GWP) on non-CO_2 GHGs. The GWP of methane is 28 and of nitrous oxide is 265.

Table 3—4: GHG breakdown of fuel emissions factors

Source	Activity	Carbon dioxide (kg CO_2-e/GJ)	Methane (kg CO_2-e/GJ)	Nitrous oxide (kg CO_2-e/GJ)	Combined GHGs (kg CO_2-e/GJ)
Natural gas	Energy generation	51.4	0.1	0.03	51.53
Diesel	Energy generation	69.9	0.1	0.2	70.2
Diesel	Vehicles	69.9	0.01	0.5	70.41

3.1.2 Scope 2 emissions estimates and methodology

Scope 2 GHG emissions are those from the indirect consumption of an energy product by a facility (NGER, 2023). The only source of Scope 2 emissions for the KPS are from the use of purchased electricity. Purchased electricity relates to parasitic power consumption at the KPS, including lighting/power, pumps and the starting up of units. The consumption of purchased electricity is not expected to increase with the proposed increase in operational hours, neither is electricity consumption expected to change significantly over time.

Table 3—5: Scope 2 emission estimates

Scope 2	Source	Activity	Average Annual Emissions (t CO_2-e)	Lifetime Emissions (2024-2045) (t CO_2-e)
Proposed hours of operation (13,800 hours per year)	Imported electricity	Electricity use	581	12,786

The calculation of Scope 2 emissions within this report was conducted using the location-based accounting method, using the projected emissions factors for the Western Australian SWIS electricity grid (DCCEEW, 2023b). These emissions factors decrease over time due to the predicted increase in renewable energy generation.

3.1.3 Scope 3 emissions estimates and methodology

Scope 3 GHG emissions are indirect emissions that occur upstream or downstream of the facility's Scope 1 and 2 boundaries. They fall into 15 categories per the GHG Protocol (GHG Protocol, 2011) and are a consequence of the activities of a facility, but from sources not owned or controlled by that facility's business (NGER, 2023).

Scope 3 emissions were identified by assessing KPS's value chain in accordance with the guidance provided by the GHG Protocol (GHG Protocol, 2011). Upstream emissions were determined to be most material as most of the KPS' Scope 3 emissions are expected to be associated with extracting, processing, and transporting natural gas. Upstream scope 3 emissions will also be generated from diesel consumption, both for energy generation and vehicle use, as well as through the electricity losses associated with the consumption of purchased electricity. The level of diesel and electricity consumption is not expected to increase under the new proposed hours of operation. All of these key sources of Scope 3 emissions fall under Category 3 of the GHG Protocol: Energy (upstream).

Scope 3 emissions may also be produced through downstream sources such as employee commuting, waste and business travel. However, when compared against the upstream emission sources, the emissions generated from these sources were determined to be immaterial and therefore have been excluded. This is the oil energy generation emissions

Table 3—6: Scope 3 emission estimates

Scope 3	Source	Activity	Category	NGER emissions factor	Annual Emissions (t CO_2-e)	Lifetime Emissions (t CO_2-e)
Proposed hours of operation (13,800 hours per year)	Natural gas	Energy generation	Purchased goods and services	4 kg CO_2-e/GJ	101,888	2,241,535
	Diesel	Energy generation	Purchased goods and services	17.3 kg CO_2-e/GJ	48	1,056
	Diesel	Vehicles	Purchased goods and	17.3 kg CO_2-e/GJ	<0.1	<1

			services			
	Electricity	Imported electricity	Purchased goods and services	11 kg CO_2-e/GJ	109	2,404
Total					**102,045**	**2,244,996**

Scope 3 emission estimates were calculating using the emissions factors and methodology described in the 2023 Australian NGA Factors (DCCEEW, 2023a), and are aligned with the GHG Protocol (GHG Protocol, 2011). The emissions factors used are detailed within Table 3—6.

3.1.4 Historic GHG emissions

Scope 1 and 2 emissions from the KPS are reported under NGER. Figure 3—1 shows the historic Scope 1 emissions over the last ten years. The KPS has consistently operated at lower levels than authorised, including the 2022-23 financial year (FY23), when it obtained temporary approval to operate at higher rates due to market circumstances. On average, the KPS has produced 101 kt CO_2-e Scope 1 emissions per year over the last 10 years, peaking in FY23 at 462 kt CO_2-e Scope 1 emissions in FY23.

At present, Schedule 1, Attachment 6 of MS 645 places a limit on GHG emissions per year for KPS (approximately 320 ktCO_2 per year). The scope of these emissions is not specified, however as the significant majority of emissions from KPS are Scope 1 due to the facility being a grid connected gas power station, Figure 3—1 focusses on Scope 1 emissions. Historical Scope 1 emissions per year are presented in Figure 3—1, with a comparison against the total allowable GHG emissions for the respective time period.

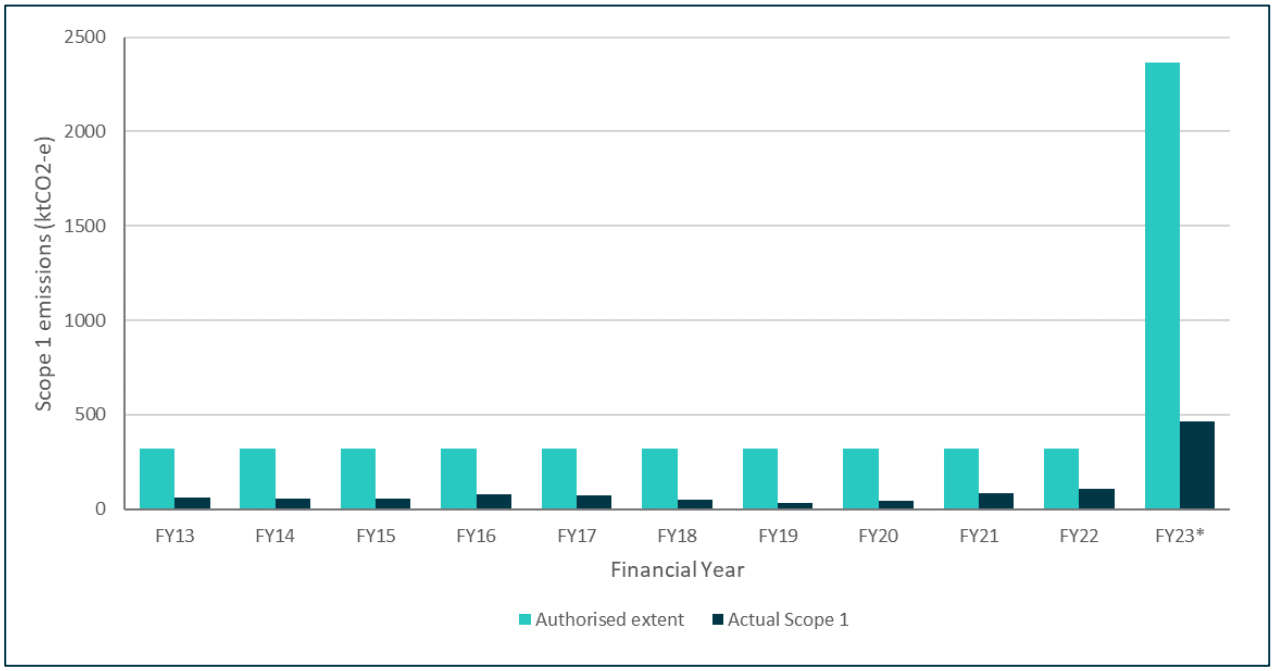

*Figure 3—1: Historic Scope 1 emissions for Kemerton Power Station. *The authorised extent for FY23 is on a November to October basis, whereas the Actual Scope 1 emissions are using NGER July to June.*

Scope 2 emissions have remained consistently low over the last 10 years, averaging at 2 kt CO_2-e per year. The reduction in Scope 2 emissions in FY23 can be attributed to an increase in operational hours, allowing the station to use electricity generated internally and be less reliant on purchasing electricity from the grid.

Historic Scope 3 emissions data for the KPS is not available. However, due to the nature of Scope 3 emissions identified in Section 3.1.3, the trend in Scope 3 emissions over this ten-year period would reflect that of Scope 1 emissions.

3.1.5 Alternative approaches

RATCH is applying to increase the annual maximum approved operation of the KPS from 2,000 hours per year to 13,800 hours per year, due to predicted increased need for generation capacity on the SWIS in the short to medium term (see Section 2.2 for further explanation).

RATCH expects that after an initial peak of gas generation in the short to medium term, demand will decrease, and the KPS will reduce operations. RATCH considered factoring this downward trajectory into the trajectory estimates; however, there is a lack of visibility when it comes to the timing and extent of the decreasing operations. Therefore to be conservative, this GHGMP has forecasted emissions based on the maximum operation scenario of this proposal. In actuality, year-on-year, emissions are expected to fall below the trajectories shown in Section 3.2.

In addition, RATCH has included the approved liquid fuel (diesel) generation operating hours (up to 200 hours per year) in the emissions trajectory; however, this fuel is a back-up only and RATCH expects that it will not need to resort to using this fuel, as has been the case for the last several years of operation. Excluding liquid fuel generation from the trajectory was considered; however, the conservative decision was chosen to include it.

Due to lack of sufficient market forecasting data, the conservative estimation assumptions were chosen in all cases.

3.2 Trajectory of emissions

3.2.1 Five-yearly targets

Table 3—7 outlines RATCH's five-yearly targets for KPS. These are proposed to be achieved on an average over each five-year period to mitigate the risk of some years requiring high operations for grid security reason. The years align with financial years as defined in the conditions.

These targets are proposed to be achieved through a combination of:

- The mitigation actions outlined in Section 3.4,
- Annual operating decisions including operating below the proposed 13,800 hours, and
- Offsets where required (information in Section 4.2).

Table 3—7: Five-yearly targets

Period	Target	Total Scope 1 emissions for period (t CO_2-e)	Average annual Scope 1 emissions (t CO_2-e)
2024-2030	N/A	9,415,913	1,345,130
2031-2035	15% reduction on proposed maximum scope 1 emissions over the whole five-year period, reaching 25% reduction in 2025	5,716,804	1,143,361
2036-2040	40% reduction on proposed maximum scope 1 emissions over the whole five-year period, reaching 50% reduction in 2040	4,035,391	807,078
2041-2045	65% reduction on proposed maximum scope 1 emissions over the whole five-year period, reaching 75% reduction in 2045	2,353,978	479,796

Figure 3—2 shows the five-year targets in chart form and demonstrates the linear trajectory to net zero by 2050, to align with the trajectory expected in the Environmental Factor Guideline for GHG emissions. KPS is expected to close by 2045. Achieving the targets by averaging over a five-year period means that while emissions reduce by 25% by the fifth year of each period (per the required linear trajectory), the emissions over the whole five-yearly periods will reduce by 15%, 40% and 60%, respectively, to spread the reduction evenly across the five years. This reflects the linear trajectory emissions reductions required in the Environmental Factor Guideline.

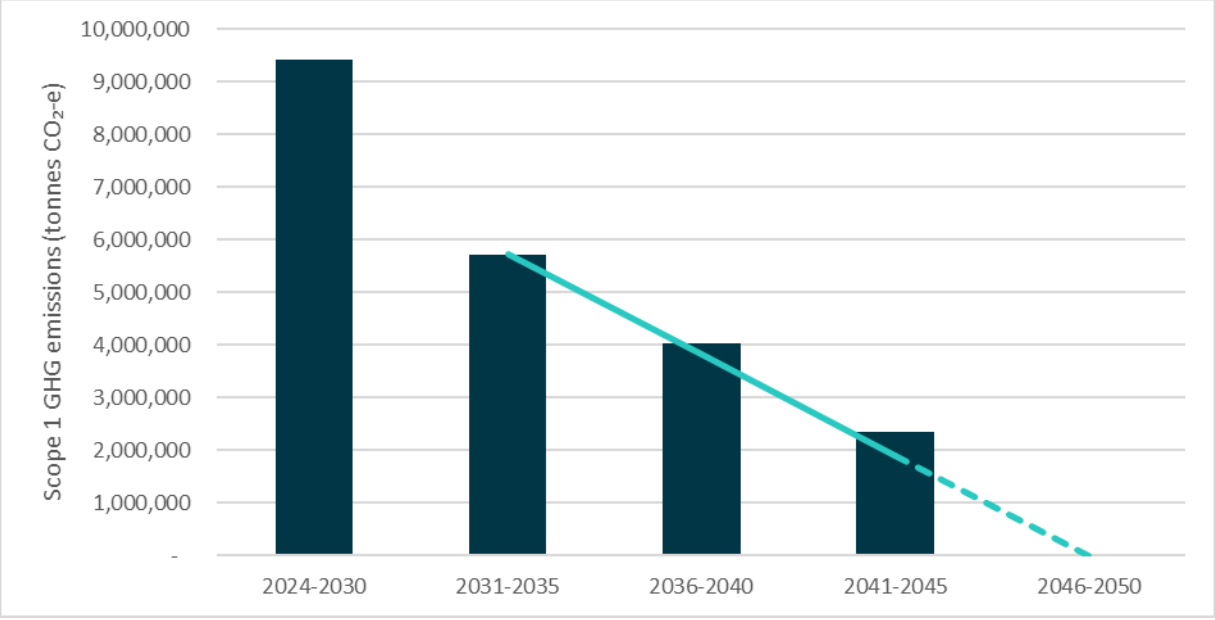

Figure 3—2: Five-year targets

3.2.2 Annual trajectory – Scope 1, 2 and 3

This section shows the maximum emissions over the life of the KPS under the proposed increased operating capacity. Section 3.1.5 explains why the expected operating reduction over time was not factored into these projections. Further information is available on planned and possible mitigation actions in Section 3.5, including qualifying the scale of mitigative action. The largest possible mitigation for GHG emissions lies in reducing the operation of the KPS over time. This is anticipated to occur in the medium to long term, as increasing renewable generation capacity is added to the SWIS, and the requirement for gas generators (specifically, the grid stability and reliability that they offer) reduces over time.

Figure 3—3 shows the maximum trajectory of Scope 1 and 2 emissions under the proposed operating hours, as well as average annual Scope 1 emissions under the targeted reductions outlined in Section 3.2.1. These emissions reductions will be achieved by a combination of technology advancements, operating strategy and offsets, depending on what is most applicable at the time.

Table 3—8 outlines the maximum trajectory of Scope 1 and 2 emissions under the proposed operating hours.

Scope 3 emissions are almost entirely dependent on the amount of gas being used. A trajectory of scope 3 emissions has not been included as it will depend on the mitigation opportunities that are adopted in future (gas reduction opportunities will impact Scope 3 differently than offsets or other opportunities). The maximum expected annual Scope 3 emissions are outlined in Table 3—6.

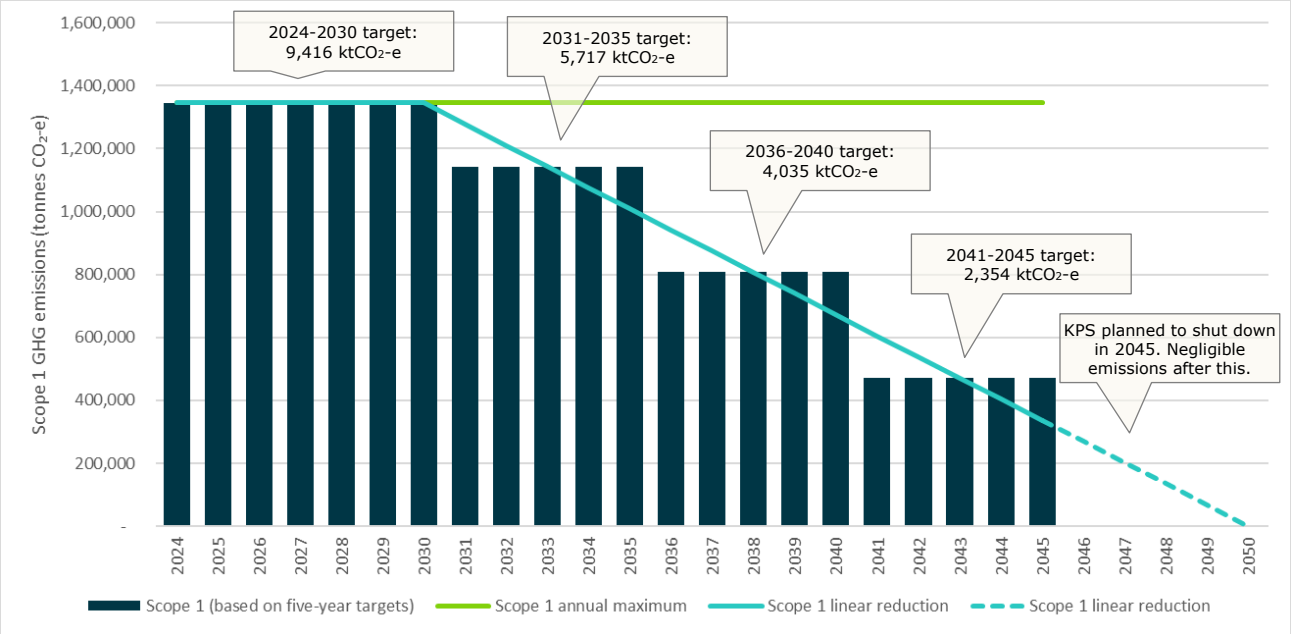

Figure 3—3: Trajectory of Scope 1 emissions

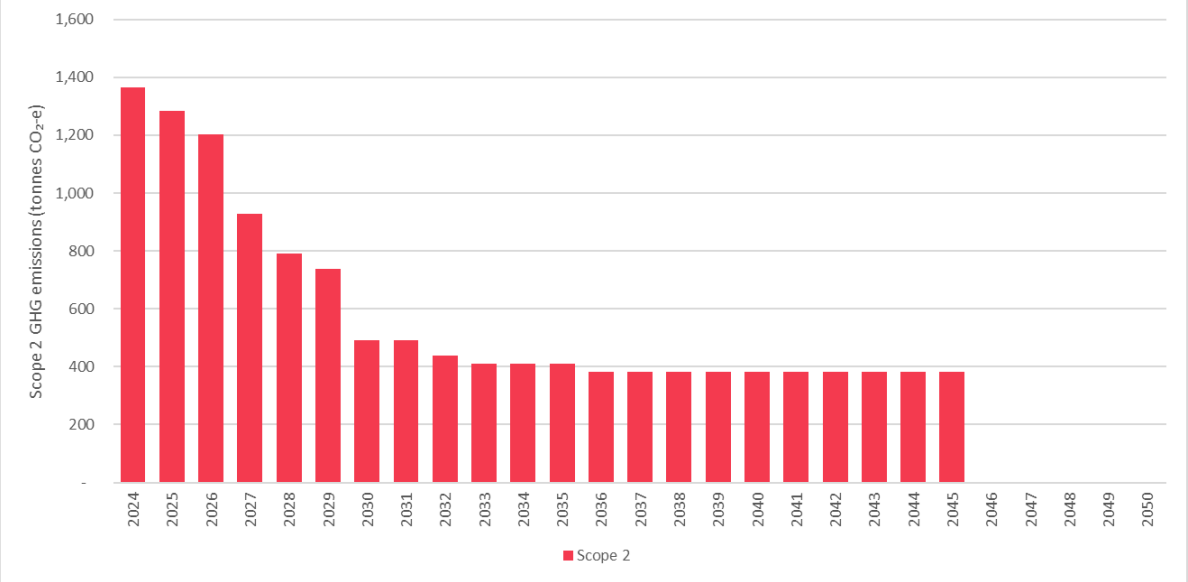

Figure 3—4: Trajectory of Scope 2 emissions

Table 3—8: Maximum trajectory of Scope 1 and 2 emissions

Year	Scope 1				Scope 2	Total Scope 1 and 2
	Natural gas	**Diesel (electricity generation)**	**Diesel (light vehicles)**	**SF6**	**Purchased electricity**	
	t CO_2-e	**t CO_2-e**	**t CO_2-e**	**t CO_2-e**	**t CO_2-e**	**t CO_2-e**
2024	1,312,571	32,517	23	19	1,448	1,346,578
2025	1,312,571	32,517	23	19	1,366	1,346,496
2026	1,312,571	32,517	23	19	1,284	1,346,414
2027	1,312,571	32,517	23	19	1,202	1,346,333
2028	1,312,571	32,517	23	19	929	1,346,059
2029	1,312,571	32,517	23	19	792	1,345,923
2030	1,312,571	32,517	23	19	738	1,345,868
2031	1,312,571	32,517	23	19	492	1,345,622
2032	1,312,571	32,517	23	19	492	1,345,622
2033	1,312,571	32,517	23	19	437	1,345,568
2034	1,312,571	32,517	23	19	410	1,345,540
2035	1,312,571	32,517	23	19	410	1,345,540
2036	1,312,571	32,517	23	19	410	1,345,540
2037	1,312,571	32,517	23	19	383	1,345,513
2038	1,312,571	32,517	23	19	383	1,345,513
2039	1,312,571	32,517	23	19	383	1,345,513
2040	1,312,571	32,517	23	19	383	1,345,513
2041	1,312,571	32,517	23	19	383	1,345,513
2042	1,312,571	32,517	23	19	383	1,345,513
2043	1,312,571	32,517	23	19	383	1,345,513
2044	1,312,571	32,517	23	19	383	1,345,513
2045	1,312,571	32,517	23	19	383	1,345,513

3.3 Benchmarking

Figure 3—5 shows the results of a benchmarking exercise, which used NGER emissions intensity data of grid-connected[3] gas generators from FY22 (NGER, 2024).

The three KPS columns depict:

- KPS's emissions intensity under the proposed scenario (blue): 0.62 t CO_2-e/MWh
- KPS's historic emissions intensity in FY22 (direct comparison to the other generators in the chart): 0.63 t CO_2-e/MWh
- KPS's emissions intensity under the current authorised extent (Attachment 6, Schedule 2 of MS 645) 0.64 t CO_2-e/MWh

This emissions intensity refers to Scope 1 only, to make it comparable to the other generators in the dataset.

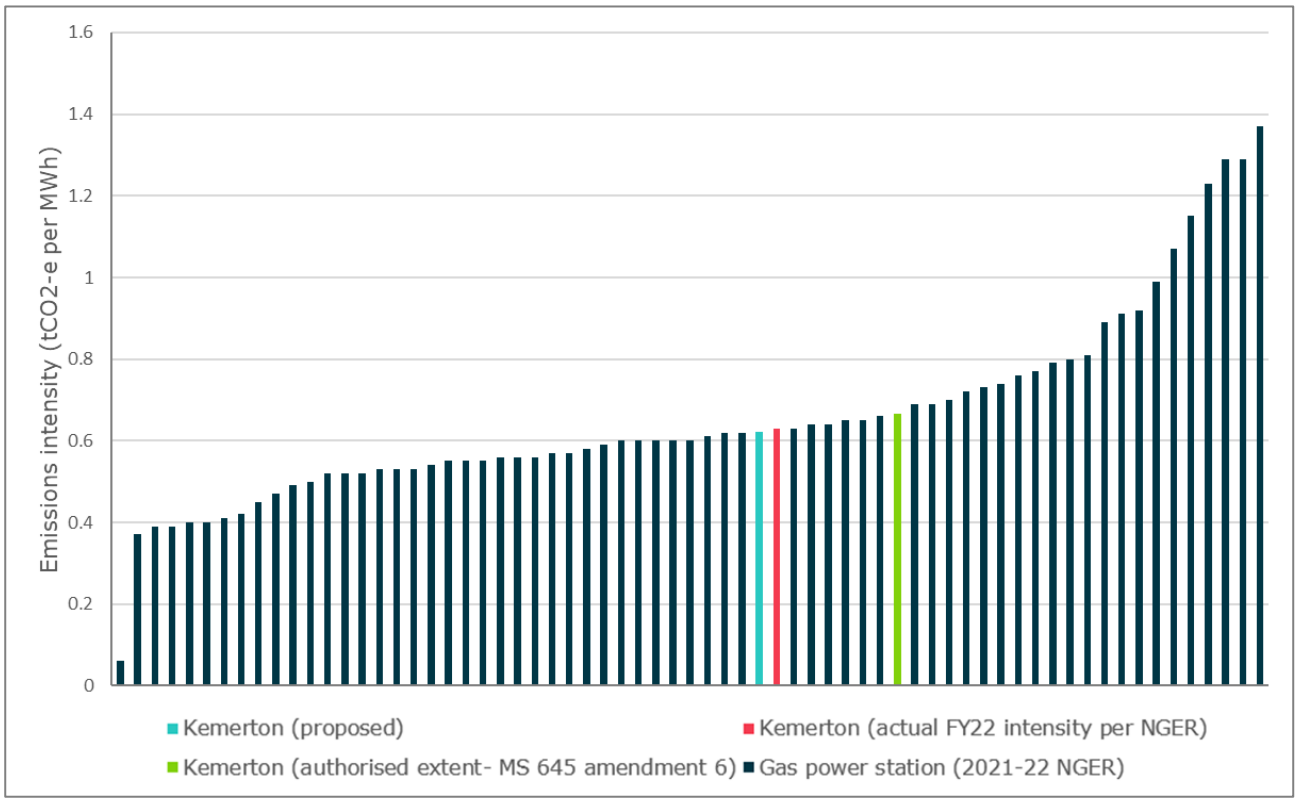

Figure 3—5: Comparison of Kemerton Power station emissions intensity for to other gas power stations in Australia. Uses 2021-22 data from NGER (2023).

Figure 3—5 Demonstrates KPS emissions intensity alongside SWIS and NWIS gas electricity generators.

Table 3-9 calls out some of the included gas electricity generators that are most similar to KPA in age and technology. Both Somerton Power Station and Laverton North Power Station have a similar emissions intensity to KPS's actual FY22 and KPS's proposed emissions intensity.

[3] Included gas generators connected to the National Electricity Market (NEM), North-west Interconnected System (NWIS) and SWIS.

Somerton Power Station's emissions intensity is slightly higher than that of KPS's authorised extent under MS 645 amendment.

KPS's emissions intensity is higher than that of facilities operating under best-practice, such as Tallawarra Power Station (see Table 3-9 and Figure 3-3). This is likely due to KPS being an older facility, as well as its operation as a peaking plant.

Emissions intensity is negatively impacted by higher ambient temperatures, however the effect of this impact has largely been mitigated by the adopted wet compression system outlined in Section 3.5. This wet compression system makes KPS' operation more robust in forecast climatic conditions.

Table 3—9: Description of similar facilities using NGER data (2023).

Facility name	Description	Emissions intensity (t CO2-e/MWh) (FY22)
KPS	Proposed case emissions intensity	0.62
	FY22 historic emissions intensity	0.63
	Authorised extent emissions intensity	0.67
Facilities of a similar age and technology		
Newgen Neerabup Power Station	Gas-fired open cycle power station comprised of two 165MW turbine units, with a combined capacity of 330 MW (Power Technology, 2024a). Commissioned in 2009 and operated as a peaking plant.	0.61
Laverton North Power Station	Gas-fired open cycle power station comprised of two turbine units with a combined capacity of 320 MW (Power Technology, 2024b). Commissioned in 2006 and operated as a peaking plant.	0.64
Somerton Power Station	Gas-fired open cycle power station comprised of four gas turbine unit with a capacity of 150 MW (AGL, 2024). Commissioned in 2003 and operated as a peaking plant.	0.73
Best practice gas-fired power stations		
Tallawarra Power Station	Comprised of two neighbouring combined gas-fired power stations (Energy Australia, 2024). Tallawarra A is a combined cycle station with fast-start capability, 440 MW capacity and commissioned in 2009. Tallawarra B was commissioned in early 2024 (not included within emission intensity) and operates as a peaking plant with a 320 MW capacity. It uses fast-start gas turbine, plans to operate on a green hydrogen blend and has direct emissions offset.	0.37

3.4 Assumptions, uncertainties, and limitations

Scope 1, 2 and 3 estimates and trajectories were calculated using NGER methods, and subject to the following assumptions:

- Scope 2 emissions were calculated using projected SWIS location-based emissions factors from *Australia's Emissions Projections 2023* (DCCEEW, 2023b)
- After 2035, SWIS emissions factor has been assumed to remain at 0.14 t CO_2-e per MWh, as projections cease at 2035.
- Maximum operations under the proposed operating hours have been assumed despite expectation that operation will not operate at this maximum every year.
- Consumption of purchased electricity, SF_6 usage and vehicle diesel consumption have been assumed to remain constant in the proposed scenario, and as such FY23 consumptions rates have been used to forecast these metrics.
- No construction emissions, as for proposal is for increased operations only.

Emissions estimates in this GHGMP have one key limitation, which is a lack of visibility into the trajectory of KPS's operation. This is due to its operation being subject to many variables including: market conditions, electricity and frequency requirements of the SWIS, and the bidding strategies of Synergy and other market participants. The lack of visibility on the future operating capacity of KPS limits RATCHs ability to make conclusive and robust commercial decisions regarding the purchase of technological mitigations that may reduce the GHG emissions of the facility.

RATCH expects that after an initial peak, operation will decrease as more renewable capacity enters the Wholesale Electricity Market. However, due to difficulty in forecasting when this change will happen, trajectories in Section 3.2 have been calculated based on the upper limit of this approval to be conservative: 13,800 hours of operation.

3.5 Mitigation measures

RATCH is proposing to increase the operational capacity of KPS in order to support the long-term transition of the SWIS to a predominantly renewables-based grid, as conventional coal plants cease operations by 2030 (Environment and Communications References Committee, 2017) and availability on the SWIS over the short to medium term is stretched (DMIRS, 2022). In this way, the proposed increase in KPS operating capacity supports the decarbonisation of the SWIS as a whole (see Section 2.2 for more information).

Where possible, best practice design and operational measures to reduce emissions associated with the operation of KPS have also be sought. Table 3—10 outlines mitigation measures considered by RATCH for the KPS' design and operation, and defines whether they have been adopted, are still under consideration, or whether they have not been adopted. These mitigation measures were identified through consultation with RATCH management, KPS personnel and subject matter experts. Offsets will be used as a last resort to achieve the five-yearly targets.

The emission intensity provided for the proposal incorporates adopted emission mitigation measures as defined in Table 3—10. While other opportunities remain future considerations, the actual emissions intensity will directly correlate with annual runtime and associated

emissions. Any future reduction opportunities and their impact on emission intensity will be captured in subsequent revisions of this GHGMP, as outlined in Section 5.

The natural gas used by KPS is sourced from the Dampier to Bunbury Natural gas Pipeline (DBNGP), which transports domestically sourced natural gas. Gas suppliers along this pipeline will be subjected to the same emission reduction requirement as KPS. Emission reduction measures implemented by gas extractors will further reduce KPS Scope 3 emissions. In particular, Western Australia's Sectoral Emissions Reduction Strategy (SERS) discusses the states plan to implement carbon capture and storage to minimise the emissions from natural gas extraction (DWER, 2023).

Table 3—10: Description of Scope 1 and 2 GHG emissions mitigation measures

Mitigation measure	Scope	Mitigation type	Feasibility	Scale of mitigation	Description	Annual emission reduction potential
Minimising run-up and run-down times	Scope 1, 2 and 3	Reduce	Adopted	Small	KPS has reduced its cooldown sequence from 15 hours to 30 minutes after a review of possible safe reductions in times (Worley, 2023). This abates a combination of internally generated and purchased electricity (dependent on availability) which are required for cooldown processes.	Scope 1: ~150 tCO_2-e Scope 2: Not able to quantify due to lack of data availability Scope 3: ~11 tCO_2-e
Wet compression system	Scope 1 and 3	Reduce	Adopted	Small (on intensity basis)	Implementing a wet compression system has increased the energy efficiency of the power station by reducing heat within the compressor. Hot ambient temperatures reduce the efficiency of the turbines, and result in less electricity per unit of gas being combusted. Wet compression mitigates these losses.	Scope 1: 4,800 tCO_2-e Scope 3: 370 tCO_2-e
Avoiding generation using diesel	Scope 1 and 3	Avoid	Adopted	Small	Generation of electricity using diesel is avoided as far as possible, with diesel only used for generation when KPS is faced with gas supply issues. Diesel is more emissions intensive than gas, and while this proposal continues to allow for up to 200 hours of operation on liquid fuel (diesel) as back-up, the ongoing intent is to avoid this unless necessary. This has been the case for several years, and diesel was not used for generating electricity at KPS in FY20, FY22 and FY23	Scope 1: 32,500 tCO_2-e Scope 3: 48 tCO_2-e

Mitigation measure	Scope	Mitigation type	Feasibility	Scale of mitigation	Description	Annual emission reduction potential
Electric vehicles	Scope 1 and 3	Avoid	Adopted / future consideration	Small	Two electric vehicles and one electric buggy are already used on site to reduce diesel consumption and its associated emissions. KPS is also considering switching the three remaining diesel vehicles used on site to electric alternatives once they become available.	Scope 1: 14 tCO_2-e Scope 3: 0.06 tCO_2-e
Offsets	Scope 1	Offset	Adopted / future consideration	Dependent on operation of given year.	RATCH Australia has committed to purchase carbon credits for 10% of emissions for every MWh generated over the previously authorised extent of 480MWh per annum in a given year.	Scope 1: up to 100,300 tCO_2-e
Batteries (Battery Energy Storage System)	Scope 1, 2 and 3	Reduce	Future consideration	Small	Battery storage onsite can allow KPS to provide grid stability services without ramping up the entire turbine. The current commercial equation - specifically the lack of visibility into the actual operating capacity of KPS deems this opportunity not feasible. However, RATCH will consider battery energy storage as an option if clear trends in future use dictate it is commercially viable. Estimate of annual emission reduction has been made on the assumption that BESS would reduce gas consumption 1,872 GJ/hr for 4 hours per day, 292 days per year.	Scope 1: 112,700 tCO_2-e Scope 3: 8,750 tCO_2-e

Mitigation measure	Scope	Mitigation type	Feasibility	Scale of mitigation	Description	Annual emission reduction potential
Carbon capture	Scope 1	Reduce	Future consideration	Large	Carbon capture technology, such as a CO_2 scrubber, would prevent or reduce the release of CO_2 generated through gas combustion. This technology could reduce up to 95% of the plant's flue gas streams; however, at significant cost. The current commercial equation - specifically the lack of visibility into the actual operating capacity of KPS deems this opportunity not feasible. However, RATCH will consider it as carbon capture technology develops further.	Up to 1,200,000 tCO_2-e
Stand-alone synchronous condenser	Scope 1 and 3	Reduce	Future consideration	Small	A stand-alone synchronous condenser onsite would allow KPS to provide frequency services to the grid without ramping up the entire turbine(s). The current commercial equation - specifically the lack of visibility into the actual operating capacity of KPS deems this opportunity not feasible. However, RATCH will consider stand-alone synchronous condenser technology as an option if clear trends in future use dictate it is commercially viable.	Not quantifiable – depends on how KPS is bid into market

Mitigation measure	Scope	Mitigation type	Feasibility	Scale of mitigation	Description	Annual emission reduction potential
Combined cycle turbine	Scope 1 and 3	Reduce	Future consideration	Large (on intensity basis)	Currently KPS operates using an open cycle system. A combined cycle power plant utilises a gas-powered turbine but 'combines' it with a secondary steam turbine. The waste heat from the gas turbine is used to produce steam which drives the second turbine. Switching to a combine cycle would reduce greenhouse gas emissions *intensity* of the power station in that it would provide higher power output for the same amount of natural gas consumption (Howarth, 2022). The current commercial equation - specifically the lack of visibility into the actual operating capacity of KPS deems this opportunity not feasible. However, RATCH will consider the addition of a combined cycle turbine as an option if clear trends in future use dictate it is commercially viable. This could drive and efficiency improvement of over 30%[4] (AEMO, 2023c)	Up to 30% reduction on intensity basis.

[4] Based on the difference in average emissions intensity of open cycle and combined cycle turbines of the NEM, published in AEMO Inputs, Assumptions and Scenarios Report (IASR) Assumptions Workbook.

Mitigation measure	Scope	Mitigation type	Feasibility	Scale of mitigation	Description	Annual emission reduction potential
Using hydrogen as fuel	Scope 1 and 3	Reduce	Not adopted	Large	KPS could technically run off a 30% blend of hydrogen and natural gas, according to Siemens Energy (2022). Hydrogen does not emit any CO_2 in combustion. However, KPS relies on the gas supply provided to it by the Dampier to Bunbury Pipeline, which does not have a hydrogen blend, and is outside of RATCH's control.	Up to 400,000 tCO_2-e

4. Other statutory and non-statutory GHG considerations

4.1 Compliance and monitoring considerations

4.1.1 National Greenhouse and Energy Reporting

The *National Greenhouse and Energy Reporting Act 2007* (NGER Act) establishes the NGER scheme whereby those who meet a facility or company GHG emissions threshold are required to report on the amount of GHG emissions on an annual basis. The objectives of the NGER scheme are to:

- inform government policy and the Australian public
- help meet Australia's international reporting obligations
- assist Commonwealth, state, and territory government programs and activities
- avoid duplicating reporting requirements in the states and territories.

The methods and criteria for calculating GHG emissions are described in the *National Greenhouse and Energy Reporting (Measurement) Determination* (DCCEEW, 2023). KPS meets the NGER threshold, and reports annually to the NGER scheme. RATCH tracks KPS's GHG emissions as part of this reporting. This will continue under the proposed operating scenario.

4.1.2 Safeguard Mechanism

Under the NGER Act, the *National Greenhouse and Energy Reporting (Safeguard Mechanism) Rule 2015* (Safeguard Mechanism) commenced in 2016 and was updated in 2023, with reforms coming into effect on 1 July 2023.

The Safeguard Mechanism is the Australian Government's policy for reducing emissions in line with the *United Nations Framework Convention on Climate Change* and its subordinate document, the *Paris Agreement*. Under Article 4.2 of the *Paris Agreement*, Australia is obliged to set a Nationally Determined Contribution (NDC) for pursuing domestic mitigation measures. Australia has set a goal to reduce emissions by 26 – 28% below 2005 levels by 2030. In the updated NDC (2022), Australia is increasing the ambition of its 2030 commitment, committing to reduce greenhouse gas emissions 43% below 2005 levels by 2030.

The Safeguard Mechanism is applicable to facilities that emit more than 100,000 tonnes of CO_2-e a year. For these facilities, legislative targets, known as baselines, are set. These baselines differ depending on the type of facility. For electricity generators connected to one of Australia's main electricity grids such as KPS, a single 'sectoral' baseline is applied. This means that KPS is not required to meet a facility specific baseline, but rather contribute to meeting the sectoral baseline of 198 million t CO_2-e annually.

The Proposal will contribute to achieving the sectoral baseline by supporting the sector's transition away from high emitting power generators such as coal-fired power stations. In particular gas-fired peaking plants such as KPS have been identified as critical strategic

reserves for power system reliability and security during the energy transition due to their ability to deliver quick, reliable supply in times where renewable generation is not sufficient (DWER, 2023). KPS expects to decrease its operations and therefore reduce its emissions output once lower-carbon energy sources become available and reliable, further contributing to meeting the sectoral baseline and the requirements of the EPA's GHG EFG.

The KPS will also continue to comply with any possible future amendments or reductions to sectoral baseline.

4.1.3 Western Australian Climate Policy

The 2020 Western Australian Climate Policy supports the State Government's goal to achieve net zero GHG emissions by 2050. The Policy determines actions taken by the Government to enhance climate resilience and support the low-carbon transition. One action of relevance to this GHGMP is the *Greenhouse Gas Emissions Policy for Major Projects* (DEMIRS, 2019), which prompted the requirement for GHGMPs in proposals such as this.

The State Government has also introduced the Western Australia's Climate Change Bill 2023 to Parliament to legislate the state's net zero target, require interim target-setting and tracking, and ensure government accountability on climate action. The Climate Bill states that the Minister must set interim targets for WA's net emissions on a five-yearly cycle. Currently, a target for government assets and government trading enterprises to reduce emissions by 80% below 2020 levels by 2030 has been set. As KPS is wholly owned by RATCH, this target does not apply to KPS. A 2035 statewide interim emissions target is expected to be announced in 2025.

The State Government has also developed Sectoral Emissions Reduction Strategy (SERS) for Western Australia to facilitate the transition to next zero by 2050 (DWER, 2023). Within the SERS, low-emissions electricity has been identified as key to the net zero transition. This includes the need for additional back-up supply from gas to ensure the reliability of the electricity supply as coal power plants are retired. In accordance with the SERS, an increase in the operation of KPS will support decarbonisation of the SWIS until alternative dispatchable low-carbon technologies become available.

4.1.4 EPA GHG Environmental Factor Guideline

This GHGMP has been developed on the basis of the EPA's GHG Environmental Factor Guideline (EFG). Most importantly, the five-yearly targets and the emissions trajectory outlined in Section 3.2 align with the EFG's expectation for a linear trajectory of emissions abatement from 2030 to net zero in 2050. As KPS's expected end of life is in 2045, this linear trajectory followed the same gradient, but halts at 75% emissions reduction by 2045.

This abatement will be achieved by a combination of mitigation opportunities outlined in this document, including:

- Technology advancements
- Operating choices (including operating less as the grid gets more stable)

- Offsets (beyond those committed to in section 4.2).

Beyond the rate of reduction, this GHGMP has also been developed using the EFG template, and has applied the required emissions accounting principles and inclusions.

4.1.5 RATCH's Climate Change Strategy

RATCH established its Climate Change Strategy with the goal of reaching carbon neutrality by 2050. Under this strategy, RATCH has committed to create and seek approaches and methods of reducing resources, energy, emission, waste, and greenhouse gas to protect, control and minimise impacts to environment, community, and society. RATCH's goals are to meet international standards, address stakeholders' expectations, and enable vigorous adaptation to the transition to the low-carbon economy. RATCH plans to achieve this through increasing its renewable energy capacity and the energy efficiency of the energy production process.

The proposed increase in operations at KPS align with RATCH's strategy, as it will contribute to the decarbonisation of the SWIS as a whole.

4.2 Offsets

RATCH has committed to purchase carbon credits for 10% of emissions for every MWh generated over the previously authorised extent of 480MWh per annum in a given year. This equates to an offset of 100,300 tCO_2-e per annum if required to operate at the proposed capacity of 2,108MWh. The amount of offsets will vary with actual operation times.

RATCH Australia has not previously purchased offsets to specifically target emissions generated from KPS. However, carbon offsetting is a key component in achieving RATCH Group's commitment of carbon neutrality by 2050. RATCH Group has embarked on afforestation, forest rehabilitation and conservation projects, to maintain and create natural carbon capture storage, and is planning to develop carbon offsetting schemes based on the projects' carbon credits. These projects are underway for carbon credits assessment. RATCH Group plans to expand the projects' forest area further, and has a target of 80 million square metres of forest areas (RATCH, 2022). RATCH Australia will fulfil a support role to achieve the parent company's objectives.

Offsets are one of the means by which RATCH intends to achieve decarbonisation of the project over time. Aside from the 10% commitment outlined above, offsets will be a last resort to achieve KPS's five-year targets after operations and technology abatement options. That said, RATCH is somewhat limited in their control over such mitigation options, and so offsets will be the back-up option, as RATCH can control this option. This strategy is still being developed.

RATCH commits to only purchasing and surrendering offsets which comply with the offset integrity standards outlined by the CER (Clean Energy Regulator, 2021). These standards are:

1. Additionality: A method should result in carbon abatement that is unlikely to occur in the ordinary course of events.

1. Measurable and verifiable: A method involving the removal, reduction or emissions of GHGs should be measurable and capable of being verified.

2. Eligible carbon abatement: A method should provide abatement that can be used to meet Australia's international mitigation obligations.

3. Evidence-based: A method should be supported by clear and convincing evidence.

4. Project emissions: Material GHG emissions as a direct result of the project should be deducted.

5. Conservative: Where a method involves an estimate, projection or assumption, it should be conservative.

RATCH will prioritise the purchase of Australian Carbon Credit units and Safeguard Mechanism Credits where possible. Due to the uncertainty around run-time and operation requirements outlined in Section 3.2, RATCH commits to reviewing the availability of appropriate offsets as part of each five-yearly review outlined in Section 5.2. If RATCH does not achieve five-yearly targets (Section 3.2.1) directly, additional offsets will be procured for the balance.

5. Adaptive management, continuous improvement, and review of the GHGMP

5.1 Adaptive management

RATCH recognises that market conditions, regulations and technologies are changing rapidly during the energy transition. Adapting GHG management and mitigation over time leads to more effective, impactful results.

Prompts that may lead to the adaption of management measures outlined in Section 3.4 and/or emissions estimates outlined in Section 3.1 are:

- Periodic review of the GHGMP, as outlined in Section 5.2
- Emergence of new mitigation technologies that are applicable to KPS
- Changes to the gas supply (or hydrogen availability) at KPS
- Updates to emissions accounting methodologies or regulations
- Changes to contracting arrangements at KPS. Currently Synergy directs KPS when to operate, due to being responsible for bidding KPS into the market. The contract between KPS and Synergy is due to expire in 2030, and a new contract may impact emissions mitigation opportunities.

If and when these prompts occur, RATCH may revisit their emissions estimates and chosen mitigation measures.

5.2 Review

The GHGMP will be formally reviewed on a five year, or as required by an approval condition, throughout the remaining operational life of KPS, unless a review is triggered by circumstances outlined in Section 5.1.

RATCH will publish a five yearly progress summary against achievement of GHG conditions and implementation of the GHGMP per the EPA's *Greenhouse Gas Emissions factor Guidelines* (2023a). Following each review, and if it is determined that a revision of the GHGMP is required, revisions will be prepared and submitted to the EPA as detailed in Section 7.

5.3 Reporting

RATCH will assess and report performance annually against the outcomes in this GHGMP in accordance with any requirements detailed in the Ministerial Statement for the Proposal.

RATCH will also continue to report KPS' Scope 1 and 2 emissions under the Commonwealth NGER Act 2007.

Table 5—1 outlines KPS' proposed reporting approach.

Table 5—1: GHG reporting for KPS

Scope 1 outcome objective	Management	Progress reporting	Frequency	Publication
Emit less than 9,416 $ktCO_2$-e net Scope 1 emissions from 2024 to 2030 **Emit less than 5,717 $ktCO_2$-e net Scope 1 emissions from 2031 to 2035** **Emit less than 4,035 $ktCO_2$-e net Scope 1 emissions from 2036 to 2040** **Emit less than 2,354 $ktCO_2$-e net Scope 1 emissions from 2041 to 2045**	Monitor Scope 1 emissions in an ongoing manner via RATCH's internal processes, and annual NGER reporting. If the objective (trigger) emissions level is breached, an investigation will be undertaken into the cause, and corrective actions will be implemented, including surrendering appropriate offsets to rectify the net emissions of the period.	Progress reporting will include: • The outcome objective for the relevant period, both from the GHGMP and any relevant requirements outlined in Ministerial conditions. • Estimate and report quantity of scope 1 emissions in the reporting period against objectives. • Identify measures implemented during the reporting period to avoid, reduce and/or offset GHG emissions. • Report on any changes made to the GHGMP.	Annually under NGER requirements, and for the Compliance Assessment Report against the Ministerial Statement.	• Compliance Assessment Report to the EPA (specifically reporting on conditions under the Ministerial Statement). • The GHGMP will be made publicly available on the RATCH Australia website Additional supplementary reporting: • Annual NGER reporting • Annual RATCH company reporting including total GHG emissions as a company.

6. Stakeholder Consultation

RATCH has an ongoing commitment to keeping its stakeholders and the community informed of its activities at its sites. A summary of stakeholder consultation undertaken during the Development of the Section 38 referral for the Proposal and this GHGMP is provided in Section 4 of the Kemerton Power Station Increased Operating Capacity Referral Supporting Information Document.

RATCH will continue stakeholder consultation during the implementation of the Proposal and this GHGMP to ensure awareness, understanding of concerns, and ongoing positive, effective two-way communication is maintained.

7. Changes to GHGMP

This is the first revision of the GHGMP for the Proposal – there are no changes to be noted in this revision.

Any changes to this GHGMP will be completed in line with the template outlined in the EPA GHP EMP Template (EPA, 2023) and shown in Table 7—1.

Table 7—1: GHGMP change template

Complexity of changes			**Minor revisions** ☐	**Moderate revisions** ☐	**Major revisions** ☐
Date revision submitted to EPA: DD/MM/YYYY					
Is the change proposed to be implemented under condition C3-3? If so, the proponent must provide a copy to the CEO at least 20 days before commencing implementation				**Yes** ☐	**No** ☐
Proponent's operational requirement timeframe for approval of revision Reason for Timeframe:				**< One Month** ☐ **< Six Months** ☐	**> Six Months** ☐ **None** ☐
Item no.	**GHG EMP section no.**	**GHG EMP page no.**	**Summary of change (separate track changes document to be provided)**	**Reason for change**	**New or increased adverse impacts to the environment? Risk to the achievement of limits, outcomes or objectives?**
1.					
2.					
3.					

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