

Environment Agency

Environmental Permit under the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

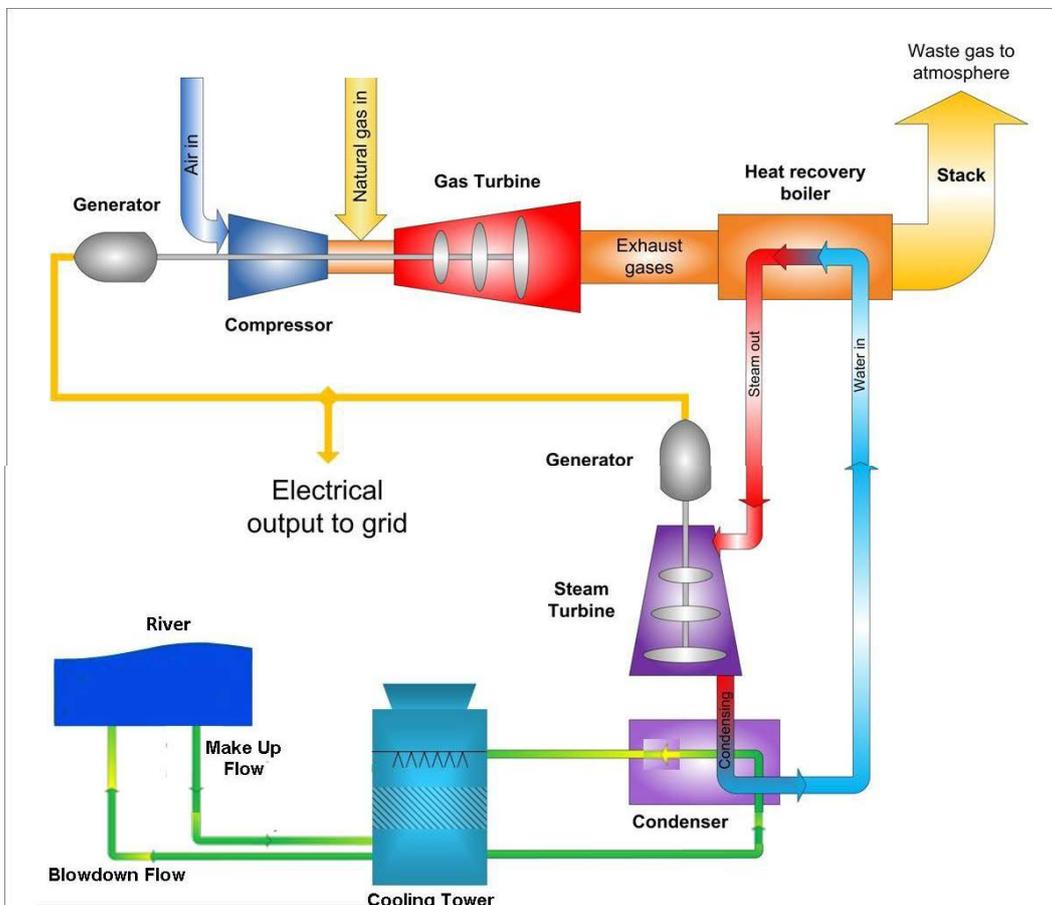
Decision document recording our decision-making process following an application for a bespoke permit

The permit number is: EPR/RP3431CZ.
The operator is: Knottingley Power Limited.
The installation is: Knottingley CCGT Power Station.

We consider that in reaching our decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that a high level of protection is provided for the environment and human health.

Description of the main features of the Installation

Knottingley comprises a gas-fired Combined Cycle Gas Turbine (CCGT) electricity generating station including a gas supply pipeline as well as cooling water supply infrastructure, low NOx burners, steam turbine and heat recovery steam generators (HRSG). The cooling system will comprise low plume hybrid cooling towers using water from and water returned to the River Aire as well as internal cooling air fans.



Each unit will comprise dedicated infrastructure and equipment for a single gas turbine, an HRSG, a steam turbine and associated electrical generator, an HRSG stack and a main transformer.

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been taken into account
- justifies the specific conditions in the permit other than those in our generic permit template.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Structure of this document

- Key issues
- Annex 1 the decision checklist
- Annex 2 the consultation, and web publicising responses
- Annex 3 Meeting the requirements of Chapter III and Annex V of the Industrial Emissions Directive (IED).

Key issues of the decision

1 – Chapter III and Annex V of the Industrial Emissions Directive (IED):

All Environmental Permits which permit the operation of new large combustion plant (LCP), as defined by Articles 28 and 29 of the IED, need to implement the special provisions for LCP given in the IED. The IED makes special provisions for LCP under Chapter III, introducing new Emission Limit Values (ELVs) applicable to LCP, referred to in Article 30(2) and set out in Annex V.

The permit contains conditions developed in consultation with industry having regard to the legal requirements of the Environmental Permitting Regulations (EPR) and other relevant legislation. This permit implements the special provisions for LCP.

2 - Plant Configuration:

The original application included a request to consider three natural gas CCGT configurations as follows:

1. Three separate 500MW generating units totalling 1,500MWe
2. Two separate 600MW generating units totalling 1,200MWe
3. Two separate 700MW generating units totalling 1,400MWe.

The applicant has justified providing three potential layouts for consideration as it reflects the gas turbine technology currently available in the marketplace. The Environment Agency has assessed the application for all three options. For the noise assessment, only a worst case scenario was considered.

Each configuration was provided with a relevant best alternative technology (BAT) justification, with the plant having an overall efficiency of around 60%, and each has been deemed acceptable. The applicant has indicated that configuration 3.) is the mostly likely option to be chosen for the build and hence this being the one permitted as the environmental permit can only be issued for one specific plant configuration. The permit includes a pre-operational condition requiring the applicant to notify us in writing of the preferred option. Given the likely configuration, the LCPs for this site are LCP420 and LCP421 which vent via dedicated 75m high stacks.

Minimum start up and shut down loads for LCP420 and LCP421 have not been provided within the application and cannot be provided until the new plant has been commissioned. An improvement condition has been set within the permit for these to be provided by the applicant. Also net thermal input values have not been provided. These are needed to be confirmed once the plant has been commissioned and an improvement condition has been set within the permit for the applicant to supply these figures.

3 – Hybrid Cooling System:

Knottingley Power Limited are proposing to use hybrid cooling towers. Whilst once-through cooling provides greatest efficiency it also requires water abstraction and

discharge in large volumes. For a 1,500MWe power plant the anticipated cooling water flow required would be 18m³/s (equivalent to 64,800m³/hr).

The two water sources available are the River Aire (average flow = 35m³/s, low flows = 7.95m³/s) and the Aire and Calder Navigation (approximately 1.4m³/s). The level of flow in the River Aire is too low to sustain the cooling abstraction requirements for 'once through cooling' as well as the environmental considerations of abstracting approximately half of the river volume for cooling. The Aire and Calder Navigation will not meet the cooling water abstraction needs of the plant.

Therefore, hybrid cooling towers are proposed for Knottingley. Water requirements have been calculated at 0.58m³/s with a discharge of approximately 0.19m³/s with the use of mounted fans to force air through the towers which greatly reduces the need for large water volumes and the environmental impact on the River Aire. An abstraction licence for 50,400m³/day (0.58m³/s) has been granted to use water from the River Aire for cooling purposes.

There are two main issues regarding the extent of the depletion of the River Aire and its effects on fisheries:

- actual abstraction from the River Aire under licence
- abstraction from the Aire and Calder Navigation which gets its water from the River Aire.

The River Aire abstraction point would be close to the discharge point whereas use of the Aire and Calder Navigation would mean that water would not rejoin the River Aire for a greater length resulting in a greater length of the River Aire being depleted.

The Environment Agency accept the use of the River Aire as the water supply source for the cooling towers as use of the Aire and Calder Navigation would cause unacceptable impacts to the environment. The Environment Agency also accepts the use of the hybrid cooling system as once-through cooling would cause unacceptable impacts to the environment and therefore considers that the proposed hybrid cooling tower option to be BAT for this site.

4 - Habitats:

Based on predicted emissions, results of the assessment of nitrogen oxides (NOx) concentration and nitrogen and acid deposition indicates that the CCGT facility will not have a significant impact at identified Local Wildlife Sites (LWS) or Sites of Special Scientific Interest (SSSI) above the exceedance criteria of 1%. Many of the identified LWS were located beyond 2km. Where the critical level or critical loads are already exceeded due to existing levels, the contribution from the CCGT facility is below the level of significance.

The exception to this is for nitrogen deposition at the woodland habitats within Shirley Pool SSSI and Brockdale SSSI where the CCGT facility is predicted to lead to increases of greater than 1% of the critical load where these are exceeded due to existing deposition levels. However, the condition reports for these woodland habitats indicate that the sites are in favourable condition and no impact is currently observed due to existing nitrogen deposition. As the CCGT facility will lead to very small increases on the existing levels of

only 0.2% to 0.4%, no discernible effect on the woodland within these habitat sites is anticipated and the impact is considered insignificant.

The Environment Agency have reviewed and checked the data submitted for the detailed air emission modelling using ADMS version 5.1. As a result of our checks, we are satisfied that the assessment of air quality impacts to designated vegetation and ecosystems is satisfactory.

As part of the Development Consent Order (DCO) submitted to the Secretary of State (SoS), the application Environmental Statement (ES) was reviewed by Natural England (NE) to ascertain any potential significant effects on any European Sites. NE were satisfied that the proposed development will not have a likely significant effect on any identified European Sites, the nearest being The Humber Estuary Special Protection Area (SPA) and The Humber Estuary Special Area of Conservation (SAC) located about 21km away. In conclusion, the distances involved ensure minimal negative effects on these sites and therefore an appropriate assessment is not required in this instance.

5 - Fisheries:

The River Aire is an European Eel and River Lamprey migratory route. In the near-field the effects of the thermal plume at the water surface are likely to include avoidance by migratory fish species such as salmon, sea trout, eels and lampreys of bodies of heated water. Salmonid fish are generally more susceptible to elevated water temperatures. However, given the relatively smaller discharge volume (from using hybrid cooling towers as apposed to once through cooling towers) and the degree of mixing with the surrounding water body such effects are likely to be minor, short term and confined to a small area of less than 25% of the width of the river.

If the thermal plume contacts with the riverbed for a sustained period of time damaging effects will occur to non-motile benthic organisms which cannot tolerate elevated temperatures. However, given the degree of mixing and cooling with the surrounding water body and the tendency of a thermal plume to float, the total bed area affected will be small. The plume is predicted to be diluted to 1°C above the ambient river temperature within 10m to 15m of the discharge point when it is predicted to be less than 10m wide. Assuming that the plume was in contact with the bed for the entire length, the maximum area that could be impinged by water over 1°C above ambient is 150m². Given the much smaller discharge volume (from using hybrid cooling towers as apposed to once through cooling towers) and the degree of mixing with the surrounding water body such effects are likely to be minor, short term and confined to a small area of less than 25% of the width of the river.

Plume modelling assessing the effects of temperature in the immediate vicinity of the outfall indicates that, given the degree of mixing and cooling with the surrounding water body and the tendency of thermal plumes to float, the total river bed area affected will be small.

Consideration has also been given to heat loss via the hybrid cooling towers as well as along the length of the 8km discharge pipeline. These are uncertainties and are difficult to model and predict but additional heat loss from these structures can be expected. It has been anticipated that by the time Knottingley CCGT has been constructed, commissioned and is starting to operate that the Ferrybridge and Eggborough Power Stations will have either partially or fully ceased operations. This will have a knock-on effect on the River

Aire by reducing overall temperature increases from multiple power station cooling water discharges.

The Environment Agency accept the applicants conclusions that the discharge would not cause unacceptable impacts to the environment, and therefore considers that the proposals are satisfactory for the site.

6 – Point Source Emissions to Air:

The effect of emissions to air from Knottingley CCGT on the areas outside of both Air Quality Management Areas (AQMA) has been assessed. This assessment shows that the carbon monoxide (CO) impacts screen out as insignificant as a process contribution (PC) for all operating scenarios. However both annual mean and 1-hour predicted concentrations of nitrogen dioxide (NO₂) do not screen out as insignificant for any operating scenario.

The application refers to three power station configurations based on 3 x 500 MW units, 2 x 600 MW units and 2 x 700 MW units. The air quality assessment has considered the available offerings within the marketplace which closely match or are broadly representative of these three power station configurations. This has resulted in the consideration of five different power station equipment options within the air quality assessment as set out in the table below:

Power Station Configurations	Modelled Option Reference	No. of CCGT units	Description
3 x 500 MW units	Option 1	3	3 x 500 MW units
2 x 600 MW units	Option 2b	2	2 x 600 MW units
	Option 3		2 x 600 MW units
2 x 700 MW units	Option 2a		2 x 730 MW units
	Option 4		2 x 779 MW units

Emissions of NO₂ and CO have been modelled for each of the five options being considered for the scenarios of operating at 'Base Load' and at 'Minimum Load'. Knottingley CCGT is anticipated to operate at Base Load for the majority of the time. Tables 4.1 and 4.4 on the following pages present the dispersion modelling results for long and short term emissions to air values for all five of the presented options in the table above.

When Knottingley CCGT is operating in base load mode the results in Table 4.1 show that, for both NO₂ and CO, the modelled predicted environmental concentrations (PEC) are within the relevant environmental assessment levels (EAL). The highest NO₂ annual mean PC is 4.0ug/m³ which is 10% of the EAL. When combined with the background concentration this gives a highest PEC of 54.5%. This is less than 70% of the EAL and not considered a significant impact.

Table 4.1 : Atmospheric dispersion modelling results – Base load - Maximum on Modelled grid

Option	Pollutant	Averaging period	EAL ($\mu\text{g}/\text{m}^3$)	Background conc. ($\mu\text{g}/\text{m}^3$)	PC ($\mu\text{g}/\text{m}^3$)	PEC ($\mu\text{g}/\text{m}^3$)	PC / EAL (%)	PEC / EAL (%)	Location of maximum	
									E	N
1	Nitrogen dioxide	Annual mean	40	17.8	4.0	21.8	10.0%	54.5%	452261	423425
		1 hour mean (99.79 th %ile)	200	35.6	61.4	97.0	30.7%	48.5%	451911	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	340.5	635.5	3.4%	6.4%	451911	423475
		Maximum 1 hour mean	30,000	295	452.2	747.1	1.5%	2.5%	451811	423625
2a	Nitrogen dioxide	Annual mean	40	17.8	3.3	21.1	8.4%	52.8%	452161	423475
		1 hour mean (99.79 th %ile)	200	35.6	45.0	80.6	22.5%	40.3%	451911	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	269.5	564.4	2.7%	5.6%	451811	423425
		Maximum 1 hour mean	30,000	295	314.1	609.0	1.0%	2.0%	451761	423525
2b	Nitrogen dioxide	Annual mean	40	17.8	3.4	21.2	8.6%	53.1%	452161	423475
		1 hour mean (99.79 th %ile)	200	35.6	43.2	78.7	21.6%	39.4%	451911	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	258.4	553.4	2.6%	5.5%	451761	423425
		Maximum 1 hour mean	30,000	295	302.3	597.3	1.0%	2.0%	451761	423525
3	Nitrogen dioxide	Annual mean	40	17.8	2.9	20.7	7.3%	51.8%	452161	423475
		1 hour mean (99.79 th %ile)	200	35.6	41.3	76.9	20.7%	38.4%	451911	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	248.1	543.0	2.5%	5.4%	451811	423425
		Maximum 1 hour mean	30,000	295	289.6	584.5	1.0%	1.9%	451811	423525
4	Nitrogen dioxide	Annual mean	40	17.8	3.7	21.4	9.1%	53.6%	452261	423475
		1 hour mean (99.79 th %ile)	200	35.6	49.4	85.0	24.7%	42.5%	451961	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	299.0	594.0	3.0%	5.9%	451811	423425
		Maximum 1 hour mean	30,000	295	353.6	648.6	1.2%	2.2%	451811	423575

At other areas where the existing concentrations are elevated, such as within the Knottingley AQMA, the contribution to annual mean NO₂ concentrations ranges from 0.36 $\mu\text{g}/\text{m}^3$ to 0.48 $\mu\text{g}/\text{m}^3$ for the five different power station equipment options, which corresponds to 0.9% – 1.2% of the annual mean EAL of 40 $\mu\text{g}/\text{m}^3$. The total annual mean NO₂ concentrations are not predicted to exceed the EAL within the Knottingley AQMA due to emissions from Knottingley CCGT. At the M62 AQMA the maximum increase is 2.0 $\mu\text{g}/\text{m}^3$, however, this occurs some distance from the M62 and there is no relevant exposure. The highest increase at locations within the M62 AQMA further to the west where relevant exposure exists is approximately 0.4 $\mu\text{g}/\text{m}^3$.

Table 4.4 indicates that predicted short term concentrations of NO₂ and CO running at 'minimum load' are generally lower than 'base load' and are within the relevant EAL.

Table 4.4 : Atmospheric dispersion modelling results –Minimum load – Maximum on the modelled grid

Option	Pollutant	Averaging period	EAL ($\mu\text{g}/\text{m}^3$)	Background conc. ($\mu\text{g}/\text{m}^3$)	PC ($\mu\text{g}/\text{m}^3$)	PEC ($\mu\text{g}/\text{m}^3$)	PC / EAL (%)	PEC / EAL (%)	Location of maximum	
									E	N
1	Nitrogen dioxide	1 hour mean (99.79 th %ile)	200	35.6	50.4	86.0	25.2%	43.0%	451861	423425
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	304.3	599.3	3.0%	6.0%	451711	423425
		Maximum 1 hour mean	30,000	295	378.7	673.6	1.3%	2.2%	451761	423575
2a	Nitrogen dioxide	1 hour mean (99.79 th %ile)	200	35.6	41.7	77.3	20.8%	38.6%	451761	423525
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	248.5	543.5	2.5%	5.4%	451761	423525
		Maximum 1 hour mean	30,000	295	274.8	569.7	0.9%	1.9%	451261	423525
2b	Nitrogen dioxide	1 hour mean (99.79 th %ile)	200	35.6	37.5	73.1	18.8%	36.6%	451761	423525
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	206.7	501.6	2.1%	5.0%	451711	423525
		Maximum 1 hour mean	30,000	295	246.1	541.0	0.8%	1.8%	451761	423575
3	Nitrogen dioxide	1 hour mean (99.79 th %ile)	200	35.6	36.4	71.9	18.2%	36.0%	451761	423525
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	216.5	511.5	2.2%	5.1%	451761	423525
		Maximum 1 hour mean	30,000	295	241.9	536.8	0.8%	1.8%	451811	423575
4	Nitrogen dioxide	1 hour mean (99.79 th %ile)	200	35.6	46.8	82.4	23.4%	41.2%	451761	423525
	Carbon monoxide	Maximum 8 hour running mean	10,000	295	275.7	570.6	2.8%	5.7%	451761	423525
		Maximum 1 hour mean	30,000	295	311.4	606.3	1.0%	2.0%	451811	423575

The air quality assessment report, which included an assessment of the CCGT plant, concludes that at points of maximum impact the total concentrations of NO₂ and CO are well within the relevant Environmental Quality Standards (EQS). They also considered areas with existing elevated concentrations, such as the M62 and air quality management area (AQMA) and the Knottingley AQMA, and concluded that at worst-case locations within these areas the facility would not result in an exceedance of the EQS but noted that there is little headroom available for additional NO₂ concentrations.

The Environment Agency reviewed and checked the data submitted for the detailed air emission modelling using ADMS version 5.1. As a result of our checks, we are satisfied that the assessment of air quality impacts to human health can be used as a basis for permit determination.

7 – Fugitive Emissions to Land and Water:

The key preventative measures are as follows:

- all liquid bulk storage will be in dedicated and suitable tanks located either internally within a building or externally within an impermeable bund. No liquids will be stored below ground. All transfer lines will be protected. Each bund will have a capacity in excess of both 25% of total tank volume and 110% of the largest tank volume.

Rainwater collected in the bunds will be pumped out after visual inspection and discharged via an oil interceptor

- main buildings will be surfaced with impermeable hardstanding. Infrastructure, subsurface structures, storage tanks, roads, areas of impermeable surfaces and drains will undergo regular and frequent inspections to check for leaks, cracks and other damage
- emergency spill procedures and interceptors will be incorporated into the plant drainage systems. Regular auditing of storage and use of potentially polluting substances will be undertaken and design quality assurance and inspection and maintenance programmes will be in place
- site surface waters from areas where oil/diesel are stored will drain to a separate drainage system. This will pass through an oil-water interceptor and grease traps producing a discharge with <10mg/l 'oils'
- hardstanding for most of the areas that will be accessible to vehicles to minimise the potential for spills to migrate to ground. Refuelling will occur only in areas of hardstanding with spill kits adjacent to all re-fuelling areas. Drain covers will be available to minimise impacts on the surface water drainage system.

The measures proposed are considered appropriate.

Annex 1: decision checklist

This document should be read in conjunction with the application, supporting information, site condition report evaluation report (SECRET) and permit.

Aspect considered	Justification / Detail	Criteria met
		Yes
Receipt of submission		
Confidential information	A claim for commercial or industrial confidentiality has not been made.	✓
Identifying confidential information	We have not identified any information provided as part of the application that we consider to be confidential. The decision was taken in accordance with our guidance on commercial confidentiality.	✓
Consultation		
Scope of consultation	<p>The consultation requirements were identified and implemented. The decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements. For this application we consulted the following bodies:</p> <ul style="list-style-type: none"> ➤ Environmental Health Department, Wakefield Metropolitan District Council ➤ Public Health England ➤ Directors of Public Health ➤ Health and Safety Executive ➤ National Grid. 	✓
Responses to consultation	The web publicising, and consultation responses (Annex 2) were taken into account in the decision. The decision was taken in accordance with our guidance.	✓
Operator		
Control of the facility	We are satisfied that the applicant (now the operator) is the person who will have control over the operation of the facility after the grant of the permit. The decision was taken in accordance with EPR RGN 1 Understanding the meaning of operator.	✓
European Directives		
Applicable directives	<p>All applicable European directives have been considered in the determination of the application. The requirements of Chapter III and Annex V of the IED relating to large combustion plant have been implemented in this permit.</p> <p>Refer to the Item 1) in the Key Issues Section and to Annex 3 of this document for further details.</p>	✓

Aspect considered	Justification / Detail	Criteria met
The site		
Extent of the site of the facility	The operator has provided plans which we consider are satisfactory, showing the extent of the site of the facility including discharge and emission points. Two plans are included in the permit and the operator is required to carry on the permitted activities within the site boundary.	✓
Site condition report	<p>The operator has provided a description of the condition of the site. We consider this description is satisfactory but have imposed a condition in the permit with regards to site baseline data (see paragraph below). The decision was taken in accordance with our guidance on site condition reports and baseline reporting under IED – guidance and templates (H5).</p> <p>With respect to the Site Condition Report (SCR) presented in Annex 3 of application EPR/RP3431CZ/A001, it was agreed with the Environment Agency that verification data, collected as part of the remediation of the land associated with the former chemical works, can form part of the baseline data for the Installation.</p> <p>These remediation works are yet to commence and a revised SCR has yet to be completed. A pre-operational condition has been set within the permit to ensure this is completed and approved by the Environment Agency before the power station construction works can commence.</p> <p>Further details and discussion are provided within the Site Condition Report Evaluation Template (SCRET) for EPR/RP3431CZ/A001.</p>	✓
Biodiversity, Heritage, Landscape and Nature Conservation	<p>The application is within the relevant distance criteria of a site of nature conservation and protected species. A full assessment of the application and its potential to affect the site and species has been carried out as part of the permitting process.</p> <p>We consider that the application will not affect the features of the sites. We have not formally consulted on the application. The decision was taken in accordance with our guidance. Please refer to Items 3), 4) and 5) in the Key Issues Section of this document for further details.</p>	✓
Environmental Risk Assessment and operating techniques		
EIA	In determining the application we have considered the Environmental Statement. We have also considered the planning permission and the committee report approving it.	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>A DCO was applied for by the applicant and approved by the SoS on 10 March 2015. The SoS confirmed that the Environmental Statement submitted with the planning application was consistent with National Policy Statements and presented no adverse effects. Therefore, the SoS is satisfied that the need for this development has been established.</p> <p>The Environment Agency also have regard for the Infrastructure Planning SI No. 680:2015, The Knottingley Power Plant Order 2015 coming into force 01 April 2015.</p>	
Environmental risk	<p>We have reviewed the operator's assessment of the environmental risk from the facility. The operator's risk assessment is satisfactory. The assessment shows that, applying the conservative criteria in our guidance on Environmental Risk Assessment, all emissions may be categorised as environmentally insignificant with the exception of NO₂ emissions to air and residual chlorine emissions to water. Please refer to Items 1) and 6) in the Key Issues Section of this document as well as in the table below.</p> <p><u>Point source emissions to air:</u></p> <p>In order to check the validity of the applicants' predictions, the Environment Agency undertook its own detailed check of the modelling and the dispersion modelling data using ADMS version 5.1. Following the review of the range of operating conditions submitted by the applicant, the Environment Agency considers that the facility is unlikely to contribute to exceedances of the EQSs for human health provided that the local background concentrations remain sufficiently below the EQS.</p> <p>An H1 assessment of the auxiliary boiler, dew point heaters and emergency diesel generator was also undertaken by the applicant as part of a Schedule 5 Notice request to assess their contribution (if any) to the overall emissions to air from the installation. The intermittent running times for each of the plant are as follows:</p> <ul style="list-style-type: none"> ➤ auxiliary boiler – one to two hours per month ➤ dew point heaters – up to 3,500 hours per year (mainly in winter months) ➤ emergency diesel generator – about 30 minutes every two weeks for testing purposes. 	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>The auxiliary boiler and emergency diesel generator screened out due to their relatively small scale and/or their intermittent usage.</p> <p>The dew point heaters were assessed further because of their operating hours. Results from the modelling indicated that the maximum annual mean process contribution (PC) increases by 0.02µg/m³ at receptors within Knottingley and 0.01µg/m³ at locations within the Knottingley AQMA. An increment of 0.04µg/m³ is predicted at receptor locations outside Knottingley. Therefore, the highest process contribution is just 0.1% of the EQS and so it was concluded that there would be no additional significant effect either outside Knottingley or within Knottingley AQMA.</p> <p><u>Point source emissions to water:</u> All pollutants (ammonia, chloride, phosphate, sodium, sulphate, biochemical oxygen demand and total suspended solids) screen out via the H1 assessment tool as less than 4% other than chlorine. The cooling water will have a maximum chlorine content of 0.2mg/l and will be up to 9°C warmer than the receiving water. Whilst the proposed level at the point of discharge is a maximum of 0.2mg/l (EQS is 0.002mg/l), the dilution afforded and the nature of chlorine in the environment will ensure no detrimental effect. This has been confirmed by the Environment Agency statistically re-assessing the data provided by the operator.</p> <p>Overdosing of boiler water treatment chemicals and cooling water biocide will be identified through ongoing monitoring and will stop automatically when free chlorine in the cooling water exceeds 0.2mg/l. The water treatment plant effluent will be collected in a neutralisation tank and monitored for pH and if this is outside the limits of pH 6 to 9 then the discharge will automatically stop until the pH is corrected. The quantity of boiler blow down water will typically be 400m³/day (0.005m³/s) and would have a typical analysis of conductivity of 25us/cm, phosphate of 5mg/l, ammonia of 1mg/l and pH of 9 to 10. Further details are provided within Item 3) in the Key Issues Section of this document.</p> <p>With regards to the package sewage treatment plant (STP) located on the power station site, the permit allows a discharge of <20m³/day of secondary treated sewage effluent. This effluent is discharged with the cooling water thus providing dilution to the treated effluent before release to the River Aire. This has been confirmed by re-assessing the data provided by the applicant and the Environment Agency agree with the conclusions that the discharge will not cause</p>	

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>significant pollution.</p> <p><u>Fugitive emissions to land and water:</u> 'Section III - Supporting Information: Form B2 Additional Info' contains the H1 risk assessment which covers fugitive emissions to water and groundwater. The key risks being leaks from or failures of storage tanks, leaks from tanker offloading and failure of pipework or drains. The Environment Agency have reviewed the operators preventative measures (see operating techniques section below) and consider that fugitive emissions will not pose a significant risk to the environment. Further details are in Item 7) in the Key Issues Section of this document.</p> <p><u>Fugitive emissions to air:</u> Steam from the HRSG, auxiliary boiler, dew point heater start-up vents, deaerator vents, pressure relief valves, blow down vents and steam turbine seals have the potential to create steam clouds. However, it is considered unlikely that the steam will reach offsite due to the separation distances thus preventing steam being released off of the site.</p> <p>Visible plumes should not be a significant issue for the site in particular the wet-dry low-plume hybrid cooling towers will be designed to be plume free down to ambient temperature of 5°C and 95% relative humidity.</p> <p>Natural gas combustion is inherently a non-odorous process. Natural gas venting from pipework and ammonia degassing from boiler water in the deaerator are potential sources of odour. Only trace amounts of ammonia will potentially be released and no associated odour is anticipated outside the immediate vicinity of the deaerator plant.</p> <p><u>Noise:</u> There is the potential for noise from the facility. There are a number of noise sources associated with the Installation and these could potentially impact nearby sensitive receptors. The sources that have been identified include (but are not limited to) the Heat Recovery Steam Generator stacks, gas turbine transformers, hybrid cooling tower fans, gas turbine air intakes, condensate pump extractors, natural gas compound and water treatment plant.</p> <p>A BS4142:2014 assessment provided by the applicant has been reviewed by the Environment Agency using Cadna-A version 4.4. We conclude that noise generated by the proposed power station will be below levels expected to have an adverse impact outside of the installation boundary and</p>	

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>can be classed as 'low impact' as defined within BS4142:2014.</p> <p><u>Accident risks:</u> There are potential accident risks and hazards associated with the Installation. The Accident Management Plan will form a key part of both the EMS and the Site Emergency Plan and will be communicated to all employees, managers and contractors who work at the site and tested using regular drills or exercises. A preventative accident regime will consider a wide range of potential hazard scenarios resulting from both normal and abnormal operating conditions.</p> <p>Prior to commissioning the plant, a site plan will be produced which identifies the location of emergency spill kits, fire fighting equipment, drain caps, drainage detail, chemical, oil and waste storage, discharge points and local neighbours. The entire site will be included within a Fire Protection System and the fire-fighting system will be tested periodically. Sizing of bunded areas and fire water treatment will be determined in accordance with PPG18 'Managing Fire Water and Major Spillages' and 'CIRIA Report 164:Design of Containment Systems for the Prevention of Water Pollution from Industrial Incidents'.</p> <p>The Installation will not be a Control of Major Accident Hazards (COMAH) site and will not impact on the health and safety activities of any such sites in the vicinity.</p> <p>Infrastructure within the site will be constructed taking into account the risk of flooding by raising all operational areas over 9.4m AOD (above ordnance datum).</p>	
Operating techniques	<p>We have reviewed the techniques used by the operator and compared these with the relevant guidance notes. Emissions of carbon monoxide have been previously screened out as insignificant and so the Environment Agency agrees that the applicant's proposed techniques are BAT for the installation.</p> <p>NO₂ emissions to air are not insignificant and have been discussed in further detail in the Key Issues and Environmental Risk Sections of this document. Low NOx burners are to be used at Knottingley.</p> <p>The proposed techniques/emission levels for priorities for control are in line with the benchmark levels contained in the TGN and we consider them to represent appropriate techniques for the facility. The permit conditions ensure compliance with relevant BREFs and ELVs deliver</p>	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>compliance with BAT-AELs.</p> <p>We have considered the applicants' justification for departure from the guidance with respect to hybrid cooling towers and accept this. Reasons and details are provided in Item 3) in the Key Issues Section of this document.</p> <p>The installation does not have combined heat and power (CHP). To ensure the power station is CHP ready (CHP-r), space requirements will be incorporated into the equipment layout design within the turbine buildings and at detailed design provision for steam or hot water options will be considered. A blank connection will be provided to facilitate future steam off take from the steam-turbine casing at an intermediate point. At present no suitable heat customers have been identified from a detailed heat mapping exercise within a 15km radius of Knottingley CCGT Power Station. There is the potential to supply any identifiable heat load up to 427MWth. The Environment Agency has reviewed the application CHP-r report and considers it has adequately addressed all options for CHP within the vicinity of the plant. Permit condition 1.2.2 has been set within the permit to review CHP viability every four years.</p> <p>In line with the DEFRA Part A guidance, to report on the scope for further improvement, a condition has been included for the operator to carry out a four yearly energy efficiency review.</p>	
The permit conditions		
Use of conditions other than those from the template	<p>Based on the information in the application, we consider that we need to impose conditions other than those in the installation permit template. The use of other conditions relate to the inclusion of the on-site domestic sewage treatment plant (STP).</p> <p>Specific conditions within the permit, in addition to those included in our generic permit template, are as follows:</p> <ul style="list-style-type: none"> ➤ 2.2.2 – specific reference to the discharge point ➤ 2.3.2 – specific requirements for STP conformance ➤ 4.3.2 and 4.3.7 – specific STP notification requirements ➤ Table S1.1 – adding STP as a directly associated activity ➤ Table S3.2 – specific STP parameters for the point source emission to water 	✓

Aspect considered	Justification / Detail	Criteria met Yes		
	<ul style="list-style-type: none"> ➤ Schedule 5 Notification proforma, Part A a) – notification requirements for the STP. 			
Pre-operational conditions	<p>Based on the information in the application, we consider that we need to impose pre-operational conditions as follows:</p> <ul style="list-style-type: none"> ➤ if timber is to be used within the cooling towers then these must undergo appropriate pre-construction washing ➤ provide an updated SCR once the remediation work has been completed and include the location of the proposed site groundwater monitoring wells ➤ prior to the commencement of the build, the applicant is required to confirm in writing the preferred configuration. 	✓		
Improvement conditions	<p>Based on the information on the application, we consider that we need to impose an improvement condition. We have imposed an improvement condition to ensure that:</p> <ul style="list-style-type: none"> ➤ an EMS is in place within six months of operation ➤ definitions of the minimum start-up load (MSUL) and the minimum shut-down load (MSDL) parameters are set ➤ provision of net rated thermal input values for LCP420 and LCP421. 	✓		
Incorporating the application	<p>We have specified that the applicant must operate the permit in accordance with descriptions in the application, including all additional information received as part of the determination process. These descriptions are specified in the Operating Techniques table in the permit.</p>	✓		
Emission limits	<p>We have decided that emission and process limits should be set for the parameters listed in the permit and have incorporated them into Tables S3.1, S3.2 and S3.3. The following substances (other than CO which is required by Annex V of the IED) have been identified as being emitted in significant quantities to either air or water and ELVs and equivalent parameters or technical measures based on BAT and Annex V of the IED have been set for these:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <u>Air:</u> nitrogen oxides carbon monoxide </td> <td style="width: 50%; vertical-align: top;"> <u>Water:</u> pH residual chlorine temperature </td> </tr> </table>	<u>Air:</u> nitrogen oxides carbon monoxide	<u>Water:</u> pH residual chlorine temperature	✓
<u>Air:</u> nitrogen oxides carbon monoxide	<u>Water:</u> pH residual chlorine temperature			

Aspect considered	Justification / Detail	Criteria met
		Yes
	<p>NO₂ emissions to air are only significant with regards to emissions from the HRSG stacks. Emissions from the auxiliary boilers, dew point heaters and diesel generators are insignificant therefore no emission limits have been set for these points within the permit.</p> <p>Sulphur dioxide emissions will be reported as six monthly concentrations on the basis of the fuel sulphur content without continuous or periodic monitoring being carried out. This is because only trace quantities of sulphur are present in UK natural gas.</p> <p>For gas turbines the Environment Agency does not require any reporting for dust emissions as natural gas is an ash free and highly efficient combustion process and the turbines do not generate additional particulate matter. The fuel gas is filtered as well as the intake air resulting in a lower dust concentration in the flue emissions compare to the ambient air.</p> <p>The IED Annex V ELVs for oxides of nitrogen and carbon monoxide apply to CCGTs when the load is >70%. This has been interpreted as 70% of the rated output load. The rated output load used here is the same as that used for calculating the percentage load when specifying the end of start-up and the beginning of shut-down.</p> <p>The applicant has indicated that Knottingley CCGT may sometimes operate below 70% base load. Therefore, an emission limit has been set for NO₂ and CO for the operational period between MSUL/MSDL and the base load to cover this operational scenario. The same emission limit has been used as for the operational period 70% to base load with the applicant confirming these are achievable.</p> <p>Air and water modelling/assessment data has been provided and demonstrates that the emissions will not cause significant pollution. We have reviewed the operator's assessment of the environmental risk and consider it to be satisfactory for the substances specified.</p>	
Monitoring	<p>We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified. These monitoring requirements have been imposed in order to meet the requirements of Annex V of the IED.</p> <p>Based on the information in the application we are satisfied that the operator's techniques, personnel and equipment</p>	✓

Aspect considered	Justification / Detail	Criteria met
		Yes
	have either MCERTS certification or MCERTS accreditation as appropriate.	
Reporting	<p>We have specified reporting in the permit. Sulphur dioxide emissions will be reported on fuel sulphur content since only trace quantities of sulphur are present in UK natural gas. Dust emissions will not be reported as the fuel gas and inlet air is filtered resulting in lower dust content.</p> <p>We made these decisions in accordance with the requirements of Annex V of the IED.</p>	✓
Operator Competence		
Environment management system	<p>There is no known reason to consider that the operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.</p> <p>The applicant is planning to have a management system in place which complies with ISO14001 within 6 months of commissioning the facility. The original EMS summary submitted with the application did not include a site closure plan. A copy of the site closure plan was provided on request.</p>	✓
Relevant convictions	The National Enforcement Database has been checked to ensure that all relevant convictions have been declared. No relevant convictions were found. The operator satisfies the criteria in RGN 5 on Operator Competence.	✓
Financial provision	There is no known reason to consider that the operator will not be financially able to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.	✓

Annex 2: Consultation and web publicising responses

Summary of responses to consultation, and web publication and the way in which we have taken these into account in the determination process.

Response received from
Public Health England - 08/06/2015.
Brief summary of issues raised
Based on the information contained in the application supplied to us, Public Health England has no significant concerns regarding the risk to the health of the local population from this installation. This consultation response is based on the assumption that the permit holder shall take all appropriate measures to prevent or control pollution, in accordance with the relevant sector guidance and industry best practice.
Summary of actions taken or show how this has been covered
Appropriate measures are discussed in "Operating Techniques" section of this decision document.

Annex 3: Meeting the requirements of Chapter III and Annex V of the IED

IED Article Reference	IED requirement	Permit condition
38	Monitoring of air emissions in accordance with Ann V Pt 3	3.5, 3.6
41(a)	Determination of start-up and shut-down periods	2.3.12 Schedule 1 Table S1.5
Annex V Part 1(1)	All emission limit values shall be calculated at a temperature of 273.15K, a pressure of 101.3kPa and after correction for the water vapour content of the waste gases and at a standardised O ₂ content of 6% for solid fuels, 3% for combustion plants, other than gas turbines and gas engines using liquid and gaseous fuels and 15% for gas turbines and gas engines	Schedule 6, Interpretation
Annex V Parts 1 and 2	Emission limit values	3.1.2 Schedule 3, Table S3.1
Annex V Part 1(6(1))	Definition of natural gas	Schedule 6, Interpretation
Annex V Part 3(1)	Continuous monitoring for >100MWth for specified substances	3.5, 3.6 Schedule 3, Table S3.1
Annex V Part3(6)	Environment Agency informed of significant changes in fuel type or in mode of operation so can check Pt3 (1-4) still apply	2.3.1 Schedule 1, Table S1.2
Annex V Part3(7)	Monitoring requirements	3.5.1 Schedule 3, Table S3.1
Annex V Part 3(8,9,10)	Monitoring methods	3.5, 3.6
Annex V Part 4	Monthly, daily, 95%ile hourly emission limit value compliance	3.5.1 Schedule 3, Table S3.1