4e. Systematic (point-by-point) assessment against the UK guidance for post-combustion carbon dioxide capture: emerging techniques. I note that in Appendix A of the BAT assessment submitted, you have made such a systematic assessment against the BAT technical review (as referenced), but a separate analysis against the UK guidance (which effectively takes the place of BAT conclusions for an emerging technique) is necessary

	Parameter	**Comments**
Power Plant selection		
2.1	Energy efficiency in plants with PCC	BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of natural gas, as detailed in Table 23 of LCP BAT conclusions, states the net total fuel utilisation (%) should be between 78–95% The CHP design is estimated to be between 80 to 85% overall energy efficiency. Slight variation in efficiency will be observed due to the different modes of operation of the cement kiln delivering different flue gas parameters e.g. temperature.
2.2	Dispatchable operation	n/a the power generated is for the carbon capture process. Also, section 2.2. states CHP & EfW are not expected to be dispatchable
2.3	Supplying heat and power for PCC operation	The Padeswood plant design has considered the following parameters stated in the guidance: Selected solvent PCC plant configuration CO2 capture rate CO2 delivery pressure
PCC plant design and operation		
3.1	Purpose	The following parameters, stated within the guidance document, have been considered for the design: Plant has been designed to capture >95% CO2 from kiln and CHP Delivery pressure to the network is over 35bar CO2 Specification being defined with the T&S co - water, oxygen and other impurities will be fundamental to the specification Atmospheric dispersion and reaction modelling tools have been used for the air quality assessment
3.2	Solvent selection	See justification for amine selection - Action 4a of not duly made letter.

3.3	Features to control and minimise atmospheric and other emissions	<u>3.3.1 Flue gas cleaning</u> Lime addition will be installed for SOx & HCl control SCR will be installed for NOx control Wet ESP installed to control Aerosols (Sulphur trioxide (SO_3) droplets and fine particulates)
		<u>3.3.2 PCC system operation</u> Operating temperatures have been determined based on proven technology
		<u>3.3.3 Absorber emissions abatement</u> A separate wash tower will be installed consisting of a 3 stage wash. Both acid and water washes are included in the design. Acid wash is considered BAT Demisters are proposed in the design for droplet removal Stack height and temperature have been considered in the design
3.4	Process and emissions monitoring	<u>3.4.1 Role of monitoring</u> Energy and resource efficiency, CO_2 capture rate, and verification that the CO_2 product is suitable for safe transport and storage will be monitored and managed accordingly. Monitoring plans for commissioning and operation will be developed during detailed design and using experience from the commissioning and operation of the Heidelberg Materials Brevik CCS plant in Norway.
		<u>3.4.2 Point source emissions to air</u> Monitoring of parameters for IED Chapter IV are well established for current operation. Techniques required to monitor volatile components of the solvent and degredation products will be implemented as required.
		<u>3.4.3 Process control monitoring</u> Techniques for process control monitoring, considering the following, will be defined as the project matures. The guidance references the following: Absorber solvent quality – percentage active solvent CO_2 loading both rich and lean solvent Maximum solvent temperature Heat stable solvent content

		Solvent colour or opacity Soluble iron and other metals and degradation products The MHI design includes ALAC, automatic load control which is designed to optimise carbon capture and amine consumption. In water or acid washes and scrubbers – pH, conductivity, loading of abated substances, flow rate Solvent usage
		<u>3.4.4 Monitoring of CO2</u> All of the following will be monitored: CO2 mass balance CO2 in fuel combusted CO2 capture rate (as a percentage) CO2 released to the environment CO2 quality These are a requirement of UKETS reporting, the connection agreement with the T&S co and the Industrial carbon capture contract with UK Government.
		<u>3.4.5 Monitoring standards</u> Monitoring to MCERTS is well established in the company. This standard will be maintained where possible as there are potentially some emissions where there are currently no standard reference methods available
3.5	Unplanned emissions to the environment	A preventative maintenance program will be established
3.6	Capture level, including during flexible operation, start-up and shutdown	The target capture rate is >95% PCC OTNOC management plan to be created
3.7	Compression	The compressor has been sized according to requirements of the T&S co delivery pressure and expected volume of CO2 captured. Water cooling for temperature control will be installed. The compressor cooling water is currently cooled using a combination of hybrid cooling towers and air fin coolers. A district heating connection point will be installed for future use if a suitable end user for low grade waste heat is identified.

3.8	Noise and odour	Noise sources have been identified, mitigation proposed and modelled conducted. Odour risk assessment was submitted with the permit application and will be reviewed during determination
3.9	Hot potassium carbonate post combustion capture plant	n/a
Cooling		
Plant cooling and reheating is a combination of many techniques i.e. Gas-gas heat exchanger, direct cooling and dry cooling. Limited water availability has been a key driver in the design.		
Discharge to water		
Effluents created during the carbon capture process will be used in the cement plant - zero liquid discharge is the design philosophy.		