John Radcliffe Hospital CHP – Non Technical Summary

This document also provides details of the site management system as requested under Form B2.5 Part 3c.

Reference: EPR/GP3231QC/A001

1. Introduction

Oxford University Hospitals NHS foundation Trust operates John Radcliffe Hospital which provides acute medical and surgical services including trauma, intensive care and cardiothoracic services. A team of 11,000 staff provide the services to the City of Oxford via four hospitals, the John Radcliffe being the largest of these. The Hospital is located two kilometres east of the centre of Oxford between Headingley Way and the A40.

Oxford University Hospitals NHS foundation Trust operates, as part of their continuing improvement at the John Radcliffe Hospital, appointed Vital Energi to design and install a 4,500kWe (9.9MWth net thermal input) Combined Heat and Power (CHP) unit and a dual fuel combination boiler within the existing boiler house, alongside a series of other associated works and site wide energy reduction measures within the estate. There is a 55m high multi-core steel chimney serving the CHP unit, the combination boiler and two existing steam boilers that have been retained.

The existing boiler house forms part of the industrial block located on the east side of the hospital and it is constructed of brickwork and cladding panels with low and high level louvers on the west, south and east façades.

Planning permission for the scheme was granted on 04/11/2013 and the installation works were completed on 13/10/2017 with the CHP becoming operation around the 01/10/2017.

This application covers the operation of the CHP unit as a Tranche B Specified Generator only. The adjacent boilers are defined as existing Medium Combustion Plant, and will be permitted separately at the appropriate time.

2. Summary of Operations

Vital Energi provides an operation, management and optimisation service for energy-generating assets located at the Energy Centre on site for the NHS Trust. This includes the servicing of steam boilers on behalf of the NHS Trust and the management of the reciprocating engine CHP. The management includes reporting of energy performance, including for CHPQA purposes (CHPQA site reference: 7359 A which been certified by CHPQA for 2017 and passed a CHPQA site audit in 2018), as well as procurement of a sub contract for planned and unplanned specialist maintenance of the CHP (through Clarke Energy).

The CHP unit is manufactured by GE Jenbacher, please see the nameplate in Appendix 1 and the Datasheet (ref. 90225-CHP-DS). This is a 9.938 MW thermal input (net) gas-fired reciprocating engine, generating up to 4.503MW of electrical output. A copy of the data sheet is provided with the application.

Clarke Energy provide comprehensive maintenance servicing of the GE Jenbacher CHP units including emergency and routine maintenance. Clarke Energy are certified to ISO14001 (see document ref. CE-ISO14001-CERT). Engine controls are fitted with an auto-dialler which will contact the on-call engineer allowing for 24 hour a day coverage. Clarke Energy has remote access to CHP monitoring systems to quickly diagnose any faults. Clarke Energy has a procedure to ensure that their staff have taken the training or qualifications required for the work they do; they keep records of this. They carry out exhaust gas analysis as part of the service routine, making adjustments to the engine settings if performance is found to be deviating from specification.

3. Risk Assessment and Pre-Application Discussions

As part of the original project development, Vital Energi and the Trust engaged with the Local Authority to consider the air quality impacts of the development. The design utilised the existing boiler house stack, which was assessed with dispersion calculations and found to provide sufficient dispersion of the products of combustion, leading to the granting of planning permission.

As a result of the 2018 amendment to the Environmental Permitting Regulations, the CHP will require a permit to operate from 1/1/2019. In line with the Environment Agency guidance we carried out the Screening Tool analysis for this site. We found that a complex bespoke application was required due to the proximity of human health and a habitat receptor which was just inside the relevant screening distance raised by the tool (please find the Screening Tool as part of our submission, ref. 90223-EP-ST).

Pre-application discussions with the Environment Agency, including the screening for sensitive habitats (found as an appendix to the dispersion model report ref. 90223-EP-DMR), and our own assessment of this, found there to be Habitats Directive sites (SSSIs) within a 5km screening distance.

Based on the results of the Screening Tool, a full dispersion model was prepared by Nifes Consulting Group to give a highly detailed risk assessment of possible impacts upon sensitive receptors (please find this report as part of our submission, ref. 90223-EP-DMR please contact Patrick Fogharty at NIFES for further supporting information, see Appendix 2 for his contact details).

The dispersion model report concluded that:

> "It is evident from the above figures that the annual NO2,, maximum ground level, contributions which are directly attributable to the combustion plant are very low, representing less than 2 % of the Air Quality Limit Values. At these concentrations, the plant has no significant adverse effect on air quality under any operating conditions we might reasonably expect.
>
> The modelling also indicated that: the impact of the emissions from plant is almost exclusively due to the CHP engine emissions, with the impact of the boiler emissions being insignificant.
>
> (The impact of this plant should be viewed in the context that it replaced existing equipment which was already impacting of the local air quality)."

Vital Energi shall liaise with the Trust to manage, mitigate and minimise risk to sensitive receptors identified through the dispersion modelling at the next opportunity provided by regular Liaison meetings between the Trust and Vital Energi.

At this stage, the Trust and Vital Energi hold the Screening Tool and Dispersion Model results as our initial Risk Assessment under this permitting scheme. The Risk Assessment will become a formal document that is reviewed annually with updates as required.

4. Summary of the key technical standards and control measures arising from risk assessment

Vital Energi staff conducting the operational service are part of Vital Energi Utilities Limited which is accredited under ISO14001 to ensure a high standard of Evironmental Management System. A copy of the ISO14001 certification (ref. VEU-ISO14001-CERT) and the Management System Manual (ref VE-MAN-0002-v7.0) is included within the application.

Vital Energi operates with a 'yellow book' process detailing procedures to be followed in an emergency as well as in normal operation. This includes records of the key on-site and off-site contacts for emergencies (for example hotlines for the Environment Agency, Health and Safety Executive, emergency services and key utilities). As an example emergency procedure, in the case of black smoke emissions or the discovery of soot in the surrounding area the affected boiler should be taken off-line immediately, and this is reported to the line manager, the Trust, and then an incident report is raised. Normal operation procedures cover the necessary risks in usual operation of the energy centres.

Following instruction from the Environment Agency, and on behalf of the Trust, Vital Energi has commissioned emissions testing on the CHP but this will not occur until January 2019 due to lack of availability of testing companies. Exova Catalyst will undertake the testing; their General Method Statement can be found as part of our submission (ref. EXO-GMS). Vital Energi will issue the full monitoring report to the Environment Agency as soon as it is available. We have included within our submission the Test Run Certificate for the CHP before it was delievered to site, this demonstrates for this engine an emissions level of 470-497 mg NO_x/m^3 at 5% O_2 reference conditions which is compliant with the emission limit value of 190mg/Nm^3 at 15% O_2 for Specified Generators.

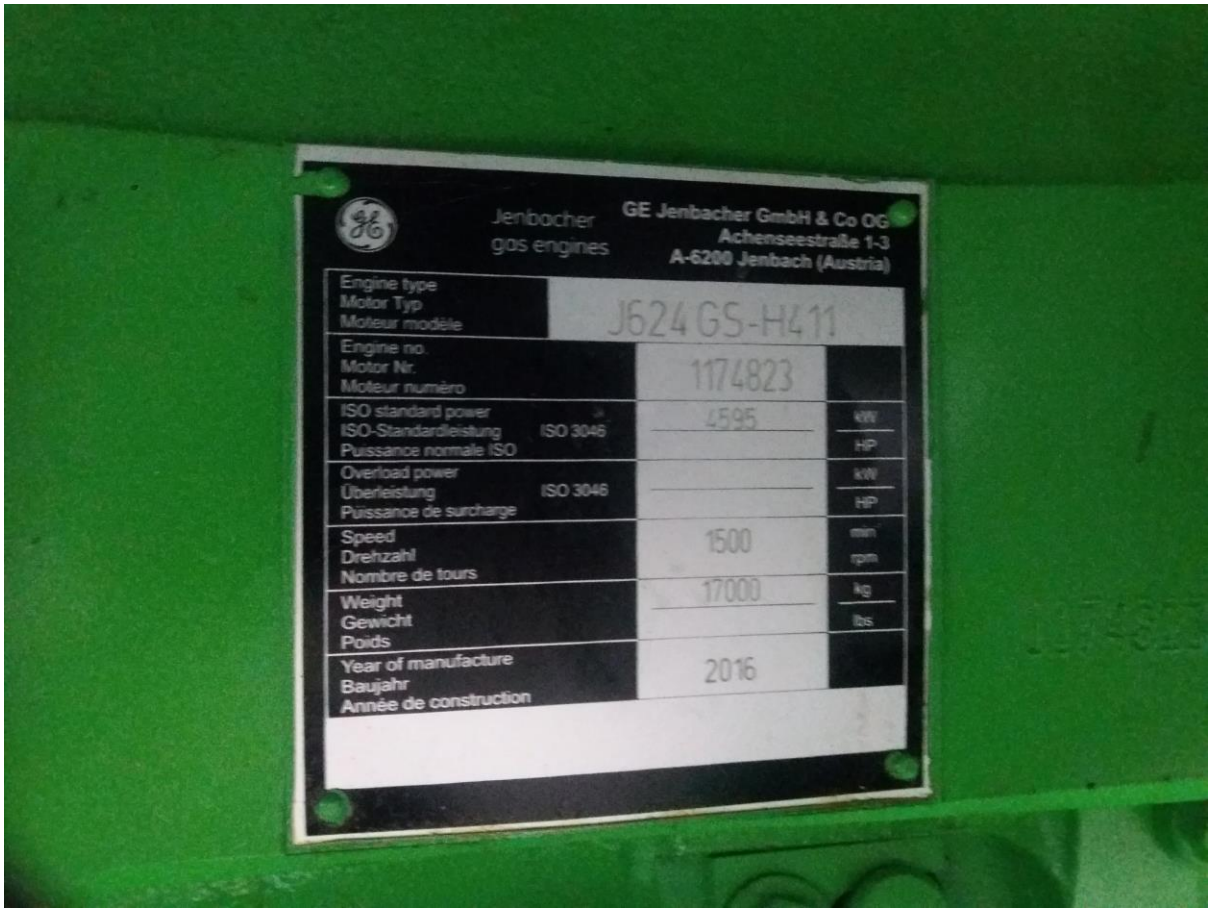
As part of the permit requirements, emissions testing in line with EA guidance M5 will take place every three years. Clarke Energy also conduct exhaust gas analysis (although this is not to necessarily to MCERTs standards) at regular service intervals for the CHP; this will further ensure that combustion conditions cannot drift excessively from specification.

Vital Energi has 24/7/365 access to plant monitoring systems and alarms through a SCADA system; this allows for monitoring of equipment performance. Half hourly performance data, which we collect on a daily basis for energy performance contract purposes, provides an early warning for any deviations in performance or other faults with the CHP. Engine performance is specified in the respective limits datasheets which limit exhaust emissions to 500 mg/Nm^3 NOx at 5% O_2 (i.e. below 190mg/Nm^3 at 15% O_2 as required under the standard 'specified generator' permit conditions). Vital Energi's Contract Managers liaise as required with the CHP maintenance sub-contractors to ensure faults are diagnosed and resolved quickly.

The Energy Centre SCADA system is fitted with alarm systems which can be accessed remotely by Vital Energi engineers. This will act as first warning if there are any problems with the CHP. Vital Energi's

SCADA system is protected by cyber security measures; these measures are regularly certified under the Cyber Essentials quality assurance scheme (see attached certification ref. VEU-CyberEssentials).

Appendix 1



Appendix 2

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