

1 AB World Foods Environmental Permit Application - Application Reference Number: EPR/VP3908PL/A001 - Summary

The following information is provided to supplement and update the above application which was submitted on 21st January 2020. The operator wishes to add an additional Directly Associated Activity to the permit application in order to operate a gas fired 2.1 MW thermal input capacity CHP engine. The operator proposes to produce the majority of the installations required electricity load through the week from the CHP, it will also provide heat recovery benefits in producing 0.5 tonnes of steam through a waste heat boiler. This represents BAT in terms of energy efficiency at the site. The operator proposes to install the CHP in 2021.

Advice was received from Emma Pemberton of the Environment Agency on 27th April that the CHP can be viewed as a directly associated activity (DAA) to the main activity, so although it comes under MCPD it will be part of the 'installation'. The full installation fee therefore covers the food and drink activity and all the DAAs so no additional fee would be required.

2 Description of the Activity

The operator proposes to install a natural gas-fired containerised combined heat and power (CHP) system solution with the engine exhaust thermal energy feeding a waste heat steam generator and thermal energy available as Low Temperature Hot Water (LTHW), to pre-heat the makeup water to the hot well.

The proposed engine has the following features:

| Engine | Electrical Output | Voltage | Electrical Efficiency | LTHW Output |
|--------------------|--------------------|---------|-----------------------|---------------------|
| JGMC412GS-NL (CO2) | 901kW _e | 400V | 41.9% | 577kW _{th} |

Heat exchangers for utilisation of the engine waste heat recovered from the engine jacket, intercooler and lube oil circuits are included and will provide a useable thermal output as LTHW as shown in the above table based on delivering flow and return temperatures of 90/70 °C.

The engine exhaust will be connected to a waste heat steam generator located in the boiler house with outputs as follows:-

| Thermal Output | Steam (Saturated at 9barg) | Feed water temperature |
|---------------------|----------------------------|------------------------|
| 341kW _{th} | 500kg/hr | 85°C |

The CHP set will be packaged off site into a fully weather-proof, acoustically lined steel container, complete with a forced draught ventilation system to provide the required cooling and combustion air for the CHP set. The containerised plant will be designed to achieve an overall noise level of 65dBA @ 10m.

The proposed gas engine is supplied based on a maximum (MCPD complaint) Nitrogen Oxide exhaust emission <250mg/Nm³ based on a dry exhaust with 5% O₂. Utilising the patented LEANOX controller, Jenbacher are able to maintain emissions between 50-100% load, while maintaining efficient combustion and engine monitoring.

Bulk lube oil tanks will be installed in the compressor room within 10m of the acoustic container and piped to the engine day tank to facilitate automatic top up for stand-alone operation. Stacked 2,500 litre capacity, bulk tanks for both clean and waste oil will be provided, with above ground pipework to the point of use.

The CHP generator will be controlled by the INNIO Jenbacher Dia.ne XT4 control panel, capable of all operational safety functions and shut-down for the system. This can be connected to a future site BMS via a Modbus or Profibus interface.

3 Emissions

The new CHP plant will comply with the relevant ELV's in the Medium Combustion Plant Directive. Annex II Part 2, Table 2 of the MCPD sets out ELV's for new engines and gas turbines:

| Pollutant | Type of MCPD | Gas Oil | Liquid Fuels other than Gas Oil | Natural Gas | Gaseous fuels other than natural gas |
|-----------------|--------------------------|---------|---------------------------------|-------------|--------------------------------------|
| SO ₂ | Engines and gas turbines | - | 120 | - | 15 |
| NO _x | Engines | 190 | 190 | 95 | 190 |
| | Gas Turbines | 75 | 75 | 50 | 75 |
| Dust | Engines and Gas Turbines | - | 10 | - | - |

The new CHP plant will comply with the emission limit of 95mg/m³ (at the reference conditions stated in the Directive) for NO_x for engines burning natural gas.

A new emission point, A6, will be added to the installation, shown on updated Drawing 2 Site Layout and Emissions Points. Updated Table 2 can be found below:

POINT SOURCE EMISSIONS TO AIR

| Emission Point Ref. | Parameter | Concentration | Unit | Source |
|----------------------------|------------------|----------------------|-------------------|---------------------------------|
| A1 | NOx | 139 | mg/m ³ | Steam Boiler 1 |
| | CO | 24 | | |
| A2 | NOx | 150 | mg/m ³ | Steam Boiler 2 |
| | CO | 336 | | |
| A3 | NOx | 311 | mg/m ³ | New Thermal Oil (Wanson) Boiler |
| | CO | 3.8 | | |
| A4 | NOx | 311* | mg/m ³ | Old Thermal Oil (Wanson) Boiler |
| | CO | 3.8* | | |
| A5 | VOC | 23 | mg/m ³ | Odour Abatement Plant |
| | Particulates | 3.9 | | |
| A6 | NOx | 95 | mg/m ³ | CHP Plant |

The two 2500 litre clean and waste lube oil containers will be located internally in the compressor room and will be bunded. Remote fill points to the tanks will be located on the external wall along with appropriate control measures to prevent leaks and spills, including drip trays, availability of spill kits and control procedures for receipt. All pipework will be above ground and subject to regulation inspection.

No odour is anticipated to occur as a result of the operation of the CHP unit.

The containerised plant will be designed to achieve an overall noise level of 65dBA @ 10m.

4 Management

The Operational & Maintenance regime will be carried out by the supplier. It will be a comprehensive contract.

There should not be any requirement for contingency due to plant breakdown. If the plant breaks down the electrical supply required will be taken seamlessly from the grid, so allowing production to carry on just at a higher cost for the utility. The CHP supplier guarantees approximately 92% availability of the unit on an annual basis.

The CHP is able to run as low as 40% load so the operator will aim to run it for as long as possible to maximize the electricity savings. Load dips over weekends due to production, so the unit is likely to be off for periods over the weekend. The operator is hoping to achieve around 7400 hours running per year.

There will be a substantial increase in gas usage in future compared to electricity as a result of running the unit.

There will be minimal extra water use as a result of the plant, and no effluent produced.

The only additional waste stream as a result of the plant will be waste lube oil which will be disposed of via existing channels used for waste oil.

5 Risk Assessment

The Air Dispersion Model for the site has been updated to include the CHP unit (See attached Appendix G_V1).

6 Drawings

The following drawings are attached to this submission:

- Updated Drawing 2 Site Layout and Emissions Points showing new emission point A6.
- Drawing 6 CHP Unit Layout showing location of unit within the installation.