Novidon Limited

Energy

Application for Environmental Permit for Modified Starch Manufacturing Facility and Medium Combustion Plant

Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH

Report Ref: CE-WH-1801-RP05-En-Final v1.0

CRESTWOOD ENVIRONMENTAL LTD

ENVIRONMENT | LANDSCAPE | NOISE | LIGHTING
ECOLOGY | HERITAGE | WATER | TREES
MINERALS / WASTE | AIR QUALITY | LAND QUALITY | VISUALISATION

Produced by Crestwood Environmental Ltd.

06 January 2023

Crestwood Report Reference: CE-WH-1801-RP05-En-Final v1.0:

Version & Status	Date Produced	Written / Updated by:	Checked & Authorised by:
Final	17/06/2021	Stephen Barnes BSc (Hons), MCIWM, CEnv	Andrew Abbott BSc (Hons), MSc
Final v1.0	06/01/2023	Andrew Abbott BSc (Hons), MSc, MCIWEM	Andrew Abbott BSc (Hons), MSc

Crestwood Environmental Ltd.
Science, Technology and Prototyping Centre
University Of Wolverhampton Science Park,
Glaisher Drive, Wolverhampton,
West Midlands, WV10 9RU

Email: info@crestwoodenvironmental.co.uk
Web: www.crestwoodenvironmental.co.uk

CONTENTS

DRAWINGS

Drawing No CE-WH-1801-DW01, Fig 1	Environmental Permit Boundary Plan	1:1000 @ A3
Drawing No CE-WH-1801-DW01, Fig 2	Factory Site Plan	1:500 @ A3
Drawing No 001	Site Plan – Drainage Layout	NTS

1 SITE DETAILS

1.1 BACKGROUND

1.1.1 This Energy Report supports an application for an Environmental Permit for a modified starch manufacturing facility and a proposed combined heat and power (CHP) plant at Coed Aben Road, Wrexham Industrial Estate, Wrexham, Clwyd, LL13 9UH ***(the Site)***. The Site is operated by Novidon Limited ***(the Applicant and Operator)*** and currently manufactures circa 15,000 tonnes per annum of modified starches.

1.1.2 The Site is used to modify starches to produce high quality wallpaper paste flake and drilling starches for the geological drilling industries. In addition, it is proposed to install a Jenbacher combined heat and power (CHP) plant In future years to generate electricity and heat for parasitic use at the Site.

1.1.3 The Site incorporates various plant and equipment in the manufacturing process (see In-process Controls Report (reference CE-WH-1801-RP01) and the BAT Assessment (reference CE-WH-1801-RP11), including reactor vessels, a dryer which used to dry starch refined on site and two existing natural gas fired boilers.

1.1.4 The dryer is a 2000kW gas fired unit. Natural gas supply is from the national grid and emissions are vented to atmosphere via a 7.5m high stack.

1.1.5 The boilers comprise a 6,000Kg/hour Yorkshireman 2 boiler and a standby 3,600Kg/hour unit, which is used when the Yorkshireman 2 boiler is off-line for servicing, maintenance etc (the standby boiler is seldom required and is operated for less than 10% of operational hours per annum). Natural gas supply is from the national grid and emissions are vented to atmosphere via a 13.5m high stack. Generated steam is used to provide heat to the drum dryers and reactor vessels.

1.1.6 The main Yorkshireman 2 boiler is a high efficiency unit, with an efficiency figure of around 95%. In addition, when compared to the running costs of an older existing boiler plant, fuel savings can be as much as 20%.

1.1.7 The CHP plant would comprise a new Jenbacher gas engine with a net rated thermal input of 1363Kw/hr. Gas supply to the CHP plant will be from the national grid. The Jenbacher JMS 312 GS-NL gas engine has a net rated thermal input of 1363Kw/hr and an electrical output of 526 kW_e, with a recoverable heat output of 659 kW_{th}. Its efficiency is quoted by the manufacturer as 86.9%. Generated electricity will be used parasitically at the Site to power the plant, whilst recoverable heat will be ducted to a 500kg/hr steam boiler to provide heat to the drum dryers and reactor vessels. Exhaust gases from the CHP plant will be discharged to atmosphere via a 15m high exhaust. Exhaust gas temperature is 80^{o}C, with heat recovery incorporated into the plant.

1.1.8 Electricity supply to operate site plant, process control systems (e.g. HMI and SCADA systems), lighting and heating the building and offices and to recharge the battery powered fork lift trucks etc is sourced from the national grid.

2 ENERGY CONSUMPTION

2.1 PRIMARY AND DELIVERED ENERGY CONSUMPTION

2.1.1 An assessment of energy use at the site has been undertaken based on the estimated energy per annum requirements to operate the Site.

Table 1: Estimated Annual Energy Consumption

Energy Source	Delivered MWh per Annum	Primary MWh per Annum
Natural gas	20,000	23,000
Electricity	1,800	4,500
Note: (1) For natural gas from the public supply a factor of 1.15 is used to convert from delivered to primary energy. (2) For electricity from the public supply a factor of 2.5 is used to convert from delivered to primary energy https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021		

2.2 SPECIFIC ENERGY CONSUMPTION (SECP)

2.2.1 Specific Energy Consumption (SECp) is calculated by dividing the total energy consumption (based on primary consumption) by the total amount of product produced at the Site. It will be used to record on going energy efficiency at the Site.

2.2.2 The Site currently manufactures 15,000 tonnes per annum of modified starches and primary energy consumption is 27,500 MWh per year. The estimated SEC for the site is 27,500MWh / 15,000 tonnes = 1.833.

2.2.3 There is no specific industry benchmark set within Sector Guidance Note IPPC S4.02 'Guidance for the Speciality Organic Chemicals' or 'How to comply with your environmental permit: Additional guidance for Speciality Organic Chemicals Sector (EPR 4.02)' for the manufacture of modified starches. However, for comparison purposes and to monitor improvements in energy efficiency, the annual energy consumption and product manufacture will be recorded and the SECp calculated accordingly for each year.

2.3 GLOBAL WARMING POTENTIAL

2.3.1 Carbon dioxide emission factors for a variety of energy sources and fuels are stated in H2 Energy Efficiency (Environment Agency, February 2002).

2.3.2 Carbon dioxide emissions arising from primary energy consumption at the Site are detailed in Table 2 below.

Table 2: Annual Carbon Dioxide Emissions (Tonnes)

Energy Source	Primary Consumption MWh	Emission Factor Kg/MWh	Global Warming Potential / CO_2 Emissions (tonnes)
Natural gas	23,000	182 (1)	4,186.00
Electricity (public supply)	4,500	210 (1)	945.00
TOTAL	-	-	**5,131.00**
Note: (1) Carbon dioxide emission factors quoted in https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021			

2.3.3 The initial estimate for annual Global Warming Potential / carbon dioxide emissions in the first year of operation and assuming circa 15,000 tonnes of modified starch manufacture is 5,131 tonnes of CO_2.

2.4 CONTROL MEASURES FOR ENERGY EFFICIENCY

2.4.1 All plant and equipment will be operated by trained personnel, in accordance with the management procedures defined within the Environmental Management System (EMS). Where necessary, operational control procedures will be refined to ensure efficient operation of equipment particularly, including during start up and shut down when energy usage is at its optimum.

2.5 ENERGY PERFORMANCE

2.5.1 As part of management reviews, to be completed under the EMS, energy performance will be reviewed by site management. The review will include:

- Comparison of quantitative performance against targets;
- Comparison with benchmark data, where available;
- Review of the implementation of energy efficiency improvements;
- Energy reporting, at a minimum frequency of annually.

2.5.2 Energy efficiency measures will reflect those identified in the following documents, where practicable:

- Sector Guidance Note IPPC S4.02 'Guidance for the Speciality Organic Chemicals;
- How to comply with your environmental permit: Additional guidance for Speciality Organic Chemicals Sector (EPR 4.02).

2.6 BASIC ENERGY REQUIREMENTS

2.6.1 Standard operating procedures are used to ensure the appropriate start-up sequences and instructions for individual items of plant, so as to maximise the efficiency of use.

2.6.2 Plant is serviced and maintained in accordance with manufacturers' recommendations to ensure

efficient operation. Maintenance will be undertaken by suitably trained personnel. Regular maintenance will improve energy performance particularly in the following plant items:

- Compressed air systems, which are frequently energy intensive, regular maintenance and checks to ensure energy efficiency is maximised and any inadvertent leakage quickly identified and repaired to prevent further loss;
- Lubrication of plant drives and motors, supplemented by planned maintenance checks to ensure the load on motors and drives is minimised as much as possible;
- Regular cleaning and maintenance of filtration systems for plant instrumentation to ensure that the operating pressure drop and load on fans and pumps is minimised, which assists in improving energy efficiency.

2.6.3 Throughput will be optimised to ensure that energy efficiency is maximised, without compromising manufacturing operations. Improvements will be delivered through process monitoring to determine plant performance, followed by subsequent work to optimise the process, which may include changes to plant operational control settings or improving the awareness of operators.

2.6.4 Good housekeeping measures will be used to minimise energy wastage. Operational best practice will be undertaken as follows:

- Maintaining housekeeping standards across the site to help reduce emissions;
- Switch off non-essential plant and equipment when not in use;
- Report any faults promptly with respect to process control and general plant operation, so that repairs to systems can be implemented quickly and matters such as spillage and reduction of throughput are addressed;
- Implement operational control procedures for individual plant and equipment, particularly during start-up and shut-down, but also during normal operation.

2.6.5 The following parameters will be incorporated into the detailed design to maximise energy savings:

- Insulation wrapping (lagging) to be installed on all pipe work carrying hot air or other hot gasses to minimise heat loss and reduce energy consumption;
- Selection of low energy systems to provide heat, cooling and lighting;
- Use of high efficiency lighting systems;
- Use of high efficiency motors.

2.7 ENERGY EFFICIENCY PLAN

2.7.1 An energy efficiency plan will be developed and maintained as part of the site's EMS. It will include:

- Monitoring and target setting for energy use;
- Use of natural lighting, where possible;

- Incorporation of low energy lighting, both internally and externally;
- Regular maintenance of equipment to ensure operating efficiency;
- Use of energy and carbon efficient plant and equipment, in accordance with the planned equipment replacement program;
- Encourage staff to switch off equipment, machinery and lights, etc, when not in use;
- Site plant will be sourced as locally as possible;
- Piping and ducting will be designed for the minimum feasible pressure loss by minimisation of pipe runs, avoidance of unnecessary changes of direction and selection of sensible pipe and duct velocities;
- The operator will take energy efficiency into consideration during the procurement stage of any plant purchase to ensure that the most energy efficient equipment available is purchased when the marginal cost is justifiable.