Sofidel UK Limited

Baglan Paper Mill - Generator Environmental Permit

Supporting technical report

RevA | 22nd March 2022

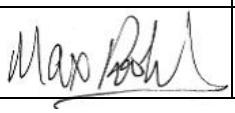
Job number 280171-00

Ove Arup & Partners Ltd
8 Fitzroy Street
London
W1T 4BJ
United Kingdom
www.arup.com

ARUP

Document verification

ARUP

Job title		Baglan Paper Mill - Generator Environmental Permit			**Job number** 280171-00
Document title		Supporting technical report			**File reference**
Document ref					
Revision	**Date**	**Filename**			
Draft 1	11 Nov 2021	Description	First draft		
			Prepared by	Checked by	Approved by
		Name	Max Rooksby / Laurence Lovel	Max Rooksby	Peter Hulson
		Signature			
ISSUE	20 Jan 2022	Filename	Sofidel Baglan - STR ISSUE 220120.docx		
		Description			
			Prepared by	Checked by	Approved by
		Name	Max Rooksby	Jonathan Payne	Matthew Evans
		Signature			
RevA	22 Mar 2022	Filename	Sofidel Baglan – STR RevA.docx		
		Description			
			Prepared by	Checked by	Approved by
		Name	Max Rooksby	Max Rooksby	Matthew Evans
		Signature			
FA		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document verification with document	✓

Contents

Non-Technical Summary

The application

The permit variation application is for the addition of emergency temporary mobile generators at the Baglan Paper Mill. The site is a 32 hectare site on the Baglan Energy Park, near Port Talbot, South Wales. Sofidel UK Limited currently hold an Environmental Permit for the operation of the paper mill and the operation of an effluent treatment plant on the site. The permit also includes the operation of various combustion activities, including a boiler, a gas-fired paper drier and a waste wood co-incineration plant.

The papermill energy supply is provided by the Baglan Bay Power Station, located on the neighbouring site, however the parent company has gone into administration and the Power Station is due to close imminently. Sofidel is developing a permanent electrical supply from the Local Distribution Network (LDN), which will be commissioned in June 2022.

During the period between the closure of the Power Station and the commissioning of the permanent power supply, electrical power will be required to maintain the production at the Paper Mill. Emergency temporary mobile generators are therefore required.

The operator

Sofidel UK is the current operator of the Baglan Paper Mill and is a subsidiary of the Sofidel Group, which was founded in 1966, The Sofidel Group currently operates at 19 sites in Europe and is one of the largest producers of paper for hygienic and domestic uses (tissue) in the world.

About the variation

The operation of the Paper Mill requires a minimum of 7.5MW of power, over the period of 6 months, during the time between when the power supply from the Baglan power station is stopped and the new connection to the local power distribution network is commissioned. This will enable the paper manufacturing process to continue and for the effluent treatment plant to continue to treat the wastewater.

12 generators have been leased to meet this demand, including three gas generators, each with a generating capacity of 1433 kW, and 9 diesel generators, each with a generating capacity of 850 kW. The total thermal capacity of the generators, subject to the variation, is 30.63 MWth. The additional combustion capacity that will be added to the permit means that the total aggregated combustion capacity, including the existing 10.5 MWth boiler and the 12.6 MWth gas-fired paper drier will be 53.73 MWth. Because the generators are mobile plant the combustion capacity is not aggregated and so the generators will be permitted as Directly Associated Activates (DAA) to the existing Schedule 1 activities on the installation.

Environmental Emissions and Abatements

The operation of the generators will result in emissions to air from the combustion process, containing nitrogen oxides (NO_2), sulphur dioxide (SO_2) and particulate matter. Various measures have been put in place to manage the potential risk from the emission on human health, including measures to reduce the emission and measures to improve the dispersion of emissions.

To reduce emissions the power demand from the manufacturing processes will be managed to maintain as lower power demand sufficient to continue to operate the plant. A power demand survey has identified that the plant will be able to run on a minimum of 7.5MW.

Three gas generators will be used in the place of diesel generators, as these produce lower emissions. It is not possible to operate more than three because of insufficient capacity in the local gas network to supply sufficient gas.

A 1 MW battery will reduce the need to continually vary the generator operation in response to a varied power demand over short periods. Reducing the need to vary operation of the generators will result in a reduction in emission cause when regularly accelerating engines.

Biodiesel will be use as fuel in the diesel generators. Hydrogenated Vegetable Oil (HVO) has been shown to reduce NO_2 emission significantly and will result in a substantial improvement compared to if diesel was used.

To improve the dispersion of emissions 3m stacks have been placed on top of all generators. The improvement in dispersion results in quicker dilution of any remaining emissions and reduces the potential for higher ground level concentration of emission both on site and also further from the site.

As part of the application dispersion modelling has been carried out to assess the effectiveness of the proposed mitigation measures and the potential for risk to human health from these emissions. The modelling shows that with the mitigation in place, including 3m stacks and use of HVO fuel, operation of the generators would not cause exceedances of air quality limit at the sensitive receptors assessed, including residential properties and care homes.

However, the two receptor points located at the Baglan Power Station would exceed the NO_2 air quality limit, but the power station site is not considered to be sensitive, as it is not publicly accessible. The air quality at the permissive path between the Sofidel site and the power station, which is publicly accessible, would also exceed the NO_2 limit, but Neath Port Talbot Council have agreed to close the path during any periods when the generators are required to be operated, meaning that this is also not considered to be sensitive. It is therefore assessed that the operation of the generator would not result in any impact on air quality at sensitive receptor locations.

Conclusions

The application to vary the permit is for the operation of temporary emergency mobile generators at the Baglan Paper Mill. These are required due to the closure of the Baglan Power Station, to enable the Paper Mill to continue manufacturing.

The generators will emit combustion exhaust that poses a risk to the local air quality. Air quality modelling completed as part of the permit application has confirmed the Best Available Techniques (BAT) mitigation measures to reduce impact on air quality, which have been shown to reduce the potential for air quality limits to be exceeded.

1 Introduction

1.1 Overview

The Baglan Papermill is operated by Sofidel UK Limited at the Baglan Energy Park in Neath Port Talbot, Wales. The papermill produces a range of paper products, including toilet paper, tissues, kitchen paper and napkins, with a production capacity of up to 120,000 tonnes of paper. It has been operating since 2003 and employs approximately 350 staff.

The Papermill is operated under Environmental Permit number ERP/BU2489IT, issued by Natural Resources Wales (NRW) in line with the Environmental Permitting (England and Wales) Regulations 2016 (EPR).

The power supply for the operation of the papermill, the associated effluent treatment plant and the various other power demands on the papermill site, including certain infrastructure and offices, is currently supplied by the Baglan Power Station, located on the neighbouring site. The Power Station started operating on September 2003 and provides power to both the National Grid and a private wire network that supplies the papermill and various organisations located in the Baglan Bay Energy Park.

Calon Energy, the company that owns the Power Station, has gone into administration and winding up orders have been issued for the closure of the power station. Following the imminent closure of the Power Station the power to the papermill will be sourced from the LDN. The project to connect the papermill to the LDN was started by Sofidel following the winding up order being issued. An application for a permanent power supply was submitted to Western Power Distribution (WPD) and following the design and construction of a new 33kV substation the permanent power supply will be commissioned in June 2022.

Current legal action has been taken by organisations receiving power from the Power Station to challenge the closure prior to connections to the Local Distribution Network (LDN) being established. Currently the closure of the Power Station has been stalled, until a legal position is decided by the court. On this basis while the power station may stop operating imminently the actual date has not been confirmed.

In the event that the Power Station is closed prior to the permanent power supply from the LDN being established temporary generators are required to provide the necessary power to operate the papermill. A power demand survey of the paper mill was undertaken which identified that a minimum 7.5MW of power is required to operate the papermill and Sofidel have therefore leased a number of generators from Aggreko to provide necessary power to enable the papermill to continue to operate.

The operation of the generators is not included as a permitted activity under the environmental permit and a permit variation is therefore required for the temporary generators to be added to the permit for the period they are required to operate. This report supports the permit variation application and provides supporting information to the application.

1.2 The operator

Sofidel UK is the current operator of the Baglan Paper Mill and is applying for the permit variation, in relation to the operation of the temporary generators.

Sofidel UK is a subsidiary of the Sofidel Group which was founded in 1966 and is one of the largest producers of paper for hygienic and domestic uses (tissue) in the world.

Sofidel currently operates at 19 sites in Europe where paper manufacture is regulated in line with the Industrial Emissions Directive (IED), the legislation that the EPR enacts in England and Wales.

1.3 The site

The Baglan Paper mill is located within a 32 hectare site on the Baglan Energy Park, near Port Talbot, South Wales, as grid reference 273023,192698.

The address of the facility is:

Sofidel UK
Brunel Way
Baglan Energy Park
Briton Ferry
SA11 2HZ

The River Neath estuary is directly adjacent to the papermill site to the north. Baglan Bay sites to the west of the site and Baglan Power station to the south. Various organisations are located on the Baglan Energy Park, in close proximity to the paper mill site to the east. Further to the east the M4 runs north to south and beyond that Briton Ferry is located to the northeast and Baglan to the southeast.

A map showing the location of the site is provided as **Annex D Site Location** to the permit application. A site condition report describing the condition of the site is included in **Annex F Site Condition Report**, submitted with the permit variation application.

1.4 Current permitted activities

The activities currently permitted at the Baglan Paper Mill are included in Table 1 below.

Table 1 Permitted activities

Activity reference	Activity listed in Schedule 1 of the EP Regulations	Description of specified activity and WFD Annex I and II operations	Limits of specific activity ad waste types
Schedule 1 activities			
A1	S6.1 A1 (b)	Producing, in industrial plant, paper and board where the plant has a production capacity of more than 20 tonnes per day. Production of paper tissue in one paper machine.	Receipt of paper pulp and other raw materialsto dispatch of finished goods
A2	S5.4 A1 (a) (ii)	Physico-chemical treatment	Effluent from paper milland on-site power generation facility only
Directly Associated Activity			
A4	Combustion Plant	Provision of steam for use in the process by burning of natural gas in one boiler with a 10.5 MW thermal input, and a 12.6 MW gas-fired paper drier.	Combustion of fuel to release of combustiongases to atmosphere The 10.5 MW thermal input combustion plantwill be maintained in hot standby to supplement the waste wood co-incinerator plant if required.
A5	Waste wood co- incineration plant	Small waste co-incineration plant for the co-incineration of non-hazardous waste wood biomass in a single co-incineration line with an 8MW thermal input	From receipt of waste to emission of exhaustgas and disposal of waste arising Waste types and quantities as specifiedin Table S2.2 of this permit

1.5 Proposed permit variation

The permit variation is for the operation of 12 temporary mobile generators, including:

- Three mobile gas generators, each with generating capacity of 1433kWe and thermal capacity of 3.67 MWth
- Nine mobile diesel generators, each with a generating capacity of 850kWe and thermal capacity of 2.18 MWth

The total thermal capacity of the generators, subject to the variation, is 30.63 MWth. The additional combustion capacity that will be added to the permit means that the total aggregated combustion capacity, including the existing 10.5 MWth boiler and the 12.6 MWth gas-fired paper drier will be 53.73 MWth.

While the total thermal combustion capacity within the Baglan Papermill installation will exceed 50MWth because the generators are mobile plant they are

not aggregated and permitted as a Schedule 1.1 combustion activity[1]. Rather they will be permitted as Directly Associated Activates (DAA) to the existing Schedule 1 activities on the installation.

In line with the SG guidelines, the three gas generators are classed as new as they were first used in 2022, see Section 2.1 below, and the diesel generators are considered as existing, as they were all first used prior to 2016. However, all generators are considered as DAA to the Schedule 1 activities, for the purpose of the permit variation.

The EID directs the use of BAT in relation to Chapter II and DAA, but is not explicit in relation to what BAT is. The NRW BAT position is that MCPD BAT applies for both Diesel and Gas generators on the basis that this is the most relevant guidance for the generators. The generators are therefore expected to meet the Emission Limit Values (ELVs) set out in the MCPD.

1.6 Report format

This Supporting Information Report focuses on the variation to the permit only, being the addition of the temporary generators and any potential effects of the variation on the wider installation. Other than the reference to the current permitted activities above, there is no reference to the wider site activities, mitigation or infrastructure unless relevant to or potentially affected by the proposed variation. In this case it is not proposed to make any wider changes to the permitted activities, operating techniques or and potential environmental effects.

Information is presented with reference to the relevant numbering system used in the application form.

[1] As per Regulatory Guidance Note No. 2 Understanding the meaning of regulated facility - Appendices 1 and 2 (publishing.service.gov.uk) you should not aggregate temporary combustion units to form a Section 1.1 Part A(1) activity

2 Temporary generators

2.1 Generator details

The generators are temporary mobile generators leased from Aggreko to provide emergency backup power in the event that the Baglan Power Station is turned off prior to the permanent power supply from the LDN being established.

They consist of:

- No. 3 of temporary mobile gas generators. Each with generating capacity of 1433kWe and thermal capacity of 3.67 MWth
- No. 9 of temporary mobile diesel generators each with a generating capacity of 850kWe and thermal capacity of 2.18 MWth

Each generator is an individually containerised units with an individual emission point from the roof surface of the containers. The location of the generators together with the associated fuel storage containers are shown in the installation boundary figure in Annex E1 Installation boundary and Annex E2 Genset layout plan.

The generators consist of three GE Jenbacher 420C612 gas engines and nine Aggreko Stackable generators based on Cummins Diesel KTA 50 G3 engines. The generator manufacture specifications are included in Table 2. The generator specification documents are included as Annex K to the application forms.

Table 2 Generator details

Parameter	Gas Generators	Diesel Generator
Model	GG1875GASCSK	Aggreko Stackable generator NHC20 /KTA50G3
Engine	GE Jenbacher 420C612	Cummins Diesel KTA 50 G3
Continuous Base kw Rating	1,433 kWe	850 kWe
Power Rating (Thermal input)	3.67 MWth	2.18 MWth
Stack Height	3m	3m
Height to top of Stack Inc Generator	8.2m	5.6m
Number of Sets	3	9

The model, unique identifying number (UIN) and age of each generator is provided in Table 3 below

Table 3 Individual generator details

Generator	Model	UIN	age	Fuel
Gen 1	KTA50G3	XATG118	29-May-07	Diesel
Gen 2	KTA50G3	XATG561	03-Mar-08	Diesel

Gen 3	KTA50G3	XBGC017	10-Apr-12	Diesel
Gen 4	KTA50G3	XBDH876	03-May-10	Diesel
Gen 5	QSK45G4	XADA003	02-Aug-02	Diesel
Gen 6	QSK45G4	XADA022	11-Oct-06	Diesel
Gen 7	QSK45G4	XADA044	02-Aug-02	Diesel
Gen 8	KTA50G3	XBRY164125-0	09-Dec-10	Diesel
Gen 9	KTA50G3	XBRY267125-0	27-Jun-11	Diesel
Gen 10	J420E	XDTP066195-0	08-Oct-21	Gas
Gen 11	J420E	XDTP063195-0	10-Jun-21	Gas
Gen 12	J420C	XCZP074187-5	23-Jul-21	Gas

On the basis of their first date of operation, and inline with the MCPD and SG Regulation guidance the diesel generators are all considered as existing plant while the gas generators are considered as new.

2.2 Operational scenario

The generators will be operated to provide up to a maximum hourly average power to the papermill of 7.5MW, the minimum requirement to operate the papermill.

The standard operation scenario is for the power to be provided by the three gas generators operating at 100% load and 5 diesel generators operating at 64% load.

On this basis the gas generators will operate for 24 hour per day, with the exception of maintenance periods. The diesel generators will cycle on a 5:4 duty standby basis and therefore operate an average of 13.3 hours per day, not accounting for maintenance periods.

During maintenance for the gas generators only one individual gas generator will be taken offline at any one time, when the power will be supplied by the two remaining gas generators operation at 100% load and seven diesel generators operating at 66% load. The maintenance periods will be limited to the minimum required to ensure that all gas generators are effectively maintained, so they operate efficiently and with low emission concentrations.

While the generators are considered to be emergency back up generators the application is not seeking the 500 annual hours exemption. This is because the proposal is to operate the generators continuously over an extended period of time, in the event that the power station may be turned off at any time.

3 Operation techniques

3.1 Environmental management system

In response to Application form 2C, Qu3d.

The Baglan Paper Mill is operated in line with the Sofidel UK Environmental and Energy Management Manual (EEMM), which is compliance with ISO 14001:2015 and ISO 50001:2018 standards. A summary of the EEMM is included as Annex C to the permit variation application.

As part of the installation the operation of the temporary generators will be in line with the policies and procedures set out in the EEMM.

The EEMM includes for an annual review of all operating plans and impacts and subsequent update to the Environments Aspects Register, to include any changes in the site operation. This will update the EEMM to take account of the compliance obligations required under the permit variation.

The operating techniques, controls and other relevant requirements set out in the document that support the permit variation application will remain relevant to the EEMM and the operation of the generators for the period that they continue to be operated as part of this permit variation.

3.2 Point source emission to atmosphere

In response to Application form 3C, Qu2 and Qu3.

3.2.1 mission sources

The emission from the operation of the generators will include point source emission to air from each generator, consisting of the exhaust gas from combustion of natural gas and biodiesel, depending on the generator.

The locations of the individual generators and emission points are is shown in Annex E2 Genset layout plan. The location details for each emission point are provided in the air quality risk assessment in Annex G Air Quality assessment report.

To meet the site wide power demand Sofidel initially leased 12 mobile diesel generators. Following air quality modelling that predicted the emissions resulting in significant exceedances in air quality limits three of the generators were changed to gas generators, to reduce the total emissions from the generator.

However, it is not possible to run more than three gas generators at the site, due to the limited capacity of the gas network, and so the remaining generators required to meet the site wide power demand must therefore be operated using diesel fuel.

3.2.2 Best available technique

A direct supply of electricity to the Papermill, either from the Baglan Power Station or from the LDN is considered to be the best available technique (BAT) for the energy supply, based on multiple parameters including emissions, material consumption, energy efficiency. However as discussed above in the event that the power station is turned off prior to the commissioning of the connecting to the LDN then this option is not available.

The NRW BAT position for both diesel and gas generators is the MCPD BAT ELV, on the basis that this is the most relevant for the combustion activities on the IED site.

The gas generators emissions are compliant with the BAT ELVs, but the diesel generators will exceed the MCPD BAT ELVs. Details of the emission characteristics are included in Table 3.

Table 4 Emissions concentrations

Parameter		Unit	Diesel generators using HVO	Gas generators
Generator Emission limit value	NOx	mg/Nm3 (@15% O_2)	974	95
	PM		12	-
	SO_2		- (No Sulphur content in HVO)	-

3.2.3 Site specific BAT

In light of the proposed deviation from indicative BAT ELVs combination of various design and operational techniques has been identified and assessed as the site specific BAT to reduce the emission concentrations and increase the dispersion of options, to avoid exceedances of air quality limits at sensitive receptors has been carried out to define site specific BAT.

The site specific BAT relating to the point source emissions to atmosphere include:

- Maintenance. Optimise generator operation - Emission reduction.
- Generator selection. All diesel vs diesel & gas generators - Emission reduction.
- Diesel fuel selection. Diesel vs HVO. Emission reduction.
- Power output level management. Emission reduction.
- Stack hight optimisation. Improve emission dispersion.

The design and operation of the generators are shown to avoid any exceedances of air quality limits at sensitive receptors and are considered to be site specific BAT.

The BAT assessment tables are included in Annex G Air Quality assessment report, Appendix A1. The full assessment is based on dispersion modelling of short term NOx emissions, as the primary pollutant of concern. During the modelling no issues were identified regarding PM_{10}, $PM_{2.5}$, SO_2, or CO emission by the detailed air quality modelling.

The assessment follows the ongoing air quality modelling and design development that has informed the proposed generator set up and operation to set out the site specific BAT.

A summary of the BAT assessment is included in the following sections below.

Maintenance - Optimise generator operation

Following the detailed initial commissioning the generators will be operated using the automatic combustion management SCADA system and will be regularly maintained, in line with the generator Operation and Management Manuals. These measures will ensure generators are operating at optimum conditions and therefore reduce the combustion emission within the flue gas.

The maintenance schedules for the gas and the diesel generators are included in Annex P1 and Annex P2. This measure is generic across all options, so no comparison is made between the options.

Generator selection – All diesel vs diesel & gas generators

As described above 12 diesel generators were originally leased from Aggreko, however, to reduce total emissions from the generators of NO_2, SO_2 and particulate matter three of the 12 diesel generators have been changed to gas generators (diesel gas hybrid) to limit the emissions.

The local natural gas supply network capacity is too small to supply sufficient natural gas for the operation of more than three generators, therefore diesel fuel is required for the operation of the remaining generators and operating 12 gas generators together is not an available option for the Sofidel site.

Air quality modelling of emission from 12 diesel generators vs three gas generators and nine diesel generators showed a reduction of 28% of the one hour average NOx emissions and 18% of the annual mean concentration.

The use of a mix of three natural gas generators and nine diesel is therefore considered to be BAT for the Sofidel site..

Fuel selection – Diesel vs HVO

The use of Hydrogenated Vegetable Oil (HVO) biodiesel results in significantly lower emission concentrations, including for NOx, CO, hydrocarbons, because it is sulphur free zero SO_2 emissions and because it is biobased effectively net zero CO_2 emissions (not including transport emissions). The reduction in NOx is approximately 40%.

It is a ‘drop in’ fuel so can be added on top of existing diesel with no modifications or cleaning of the engines. The fuel is more energy dense than regular diesel however typically there is an increase in fuel use of approximately 3%.

Modelling of emission with diesel generators using diesel vs HVO showed a reduction of 29% of the one hour average NOx emissions and 8% of the annual mean concentration.

While the fuel is more expensive than standard fuel (costs not available) this is not cost prohibitive and so due to the significant reduction in emissions the use of HVO when compared to diesel is considered to be BAT.

The HVO that will be used in the generators is a biodiesel manufactured from waste cooking oils to sufficient specification so that it is no longer a waste material but can be used as a bio diesel. Annex N1 include the HVO specification sheet provided by the preferred supplier.

Power output level management

The total power generation capacity of the 12 generators installed on the site operating at 100% load is 11.95 MW.

The NO_2 emissions are directly linked to the quantity of fuel burner and therefore the load that the generators are operated at and the power output of the generators.

A power demand survey of the papermill was carried out to identify what the minimum power demand of the site is while maintaining operation of the papermill, to reduce the emission from the site. The survey identified that the minimum power demand required while the papermill is still able to operate is 7.5 MW, as an hourly average. The hourly average is considered the relevant averaging period, so this correlates to the averaging period for NO_2 emission limits and air quality limits, the key air quality parameter for the emission.

The power demand is characteristically varied as individual demands start and stop across all of the different activities in the mill, meaning instantaneous peaks may be significantly above the hourly average. A 1MW battery has also been commissioned together with the generators to smooth off the maximum power supply peaks required from the generators, by supplementing the peaks with stored power from the battery.

By limiting the significant changes to the power demand from the generator this will make the operation of the generator more consistent and therefore the fuel use and emission more efficient.

To supply the 7.5 MW power the operation of the generators will consist of the three gas generators operating at 100% load, to provide a total of 2.55 MW power. The diesel generators will be operated by the SCADA system on a power on demand basis, with the load they are operated at based on the demand side call for power from the papermill site. The system will automatically switch generators on and off as demand fluctuates, with a priority to maximise the running of the gas generators, so diesel generators will be switched off first if power requirements drop. This system will therefore reduce the operation and loading on the generators to a minimum, which will in terms reduce the amount of fuel used and the levels of emissions, including to air and noise.

Based on the power demand survey the total power produced will be limited to a total of 7.5 MWe on an hourly average, based on the varying load operation, as described above, of:

- three gas generators with a maximum total power output of 4.30MW and a total thermal capacity of 11.01 MWth; and
- six diesel generators with a maximum total power output of 7.65 MW and a total thermal capacity of 19.62 MWth.

During maintenance of the gas generators the operation scenario will consist of:

- two gas generators with a combined total power output of 2.87MW
- seven 7 diesel generators with a combined total power output of 4.63MW

The maintenance periods would be limited to as short as possible periods to reduce the periods of increased emissions (see Annex G Air Quality assessment report)

Minimising the power demand reduces the overall emissions. The air quality modelling considered various power demand scenarios, including 5MW, 7MW, 9MW and 100% loading (11.95 MW). However, because 7.5 MW is the minimum power demand and operating at this level has been shown not to cause air quality emissions at sensitive receptors (see Annex G Air quality assessment report) this operating demand profile is considered to be BAT for the papermill.

The additional capacity provided by the generators provides resilience in the power supply, in the event of the failure of one or more generators, and allow the generators to operate below 100% load. This will result in improved overall emissions and reduce overall wear in the generators compared to operating close to 100% load.

Stack hight optimisation - emissions dispersion

The combustion exhaust from the generators is emitted via a vent on the top of the generators. The emission dispersion is influenced by the exhaust flow rate, the diameter of the discharge point and the temperature of the exhaust, all of which influence the rate the emissions mix with the air and therefore the concentration level of the emissions in the air. Increasing the height of discharge above the ground benefits the dispersion and therefore the ground level concentrations.

The 12 diesel generators initially leased were supplied without stacks, which is typical of temporary mobile generators. The air quality modelling identified a significant level of impact on the local air quality if the generators would be started.

3m stacks were available immediately so have been fitted to the generator to improve dispersion when the generators have to start. 6m and 12m stacks can also be manufactured , but these have a lead time of 2 months from the date of order, (therefore fitted in May if ordered now) and a total supply and fitting cost of £200,000 for the 9m diesel generator stacks (6m was not costed although it is understood the cost difference is not significant).

The Air quality assessment model predicted that with stack heights of 3m on all generators, and diesel generators operating in line with the BAT measures identified above that there would be exceedances of the air quality standards for hourly mean NO_2 at two receptors, located at the adjacent former Baglan Power Plant and the adjacent permissive path to the west of the site.

The Power Plant site is not accessible by the public and so is not considered to be a sensitive site, inline with the Air Quality Standards Regulations 2010, as there will be no public exposure. Regarding the permissive path it has been agreed with Neath Port Talbot Council that this footpath will be closed during the periods that the generators are required to operate, see Annex Q submitted with the application, and so is also not considered a sensitive receptor site. As such, no significant impacts are predicted to occur on the basis of a 3m stack.

The modelling predicted that with stacks of 12m above the diesel generators there would be no exceedances of the hourly mean NO2 at any locations. However the cost of adding 12m stack has been quoted by Aggreko as £200,000 and these would have to made as bespoke items rather than the 3m stacks that are stocked by Aggreko as standard items. They would also take 2 months to commission, so are not immediately available and if fitted by 20th May these would only be in use for one month, onto the connection to the local distribution network was completed in June.

On the basis that the use of 3m stacks, with the other design and operational measures, would not result in any exceedances of air quality limits at sensitive receptors together with the fact that 12m stacks would only be in place for 1 month and have a significant cost we consider the use of 3m stacks to represent BAT.

Site specific BAT conclusion

On the basis of the BAT assessment summarised above we consider that the site specific BAT for the temporary generators is the combination of :

- Operation of 3 gas generators and 9 diesel generators on a 3 gas 5 diesel generators basis, with limited maintenance periods consisting of two gas, seven diesel generators.
- Use of HVO fuel in all diesel generators.
- Maximum total hourly average power output from generators of 7.5 MW.
- Regular maintenance of all generators to ensure optimum operation.
- 3m stacks on all generators.

3.3 Point source aqueous emissions

There are no aqueous point sources emission from the generators.

3.4 Point source emission to land

There are no point sources emission to and from the generators.

3.5 Fugitive emission

A fugitive emissions risk assessment has been completed, which has identified potential fugitive emissions and measures to manage any potential significant releases. The assessment is included with the application as Annex L.

3.6 Raw materials

In response to Application form C3, Qu 3c and Qu 6d.

The types and amount of raw material used by the generators are included in Table 3 below.

Table 5 Raw materials

Material	**Use**	**Storage**	**Annual through-put: over 6 months operation**	**Description of how material is used and any main hazards**
Natural gas	Combustion	Direct supply from the national gas mains to the generator. No storage on site.	5M m3	The gas is burnt as the fuel to produce power. Results in NO2, CO2 and particulate matter.
Biodiesel – Hydrogenated Vegetable Oil (HVO)	Combustion	Stored on site is five 20,000 litres capacity storage tanks. Max storage on site is 100,000 litres	3,900 m3	Biodiesel burnt as fuel in the combustion process to produce power. Results in gaseous emissions including CO2, NO2 and particulate matter.
Coolants and oils	Use for maintenance	Maintenance materials will not be stored on site, but will be brought to site by Aggreko as required.	Negligible	Small amounts of various materials will be used as part of the maintenance of the generators. No further details are currently available.

The biodiesel fuel will be stored in five diesel storage tanks on the site, each with a capacity of 20m^3. The diesel fuel tanks provide double containment with twin walled for leakage containment. The secondary containment volume is 110% of the fuel storage tanking, to contain all fuel in the event of failure of the primary containment.

The diesel generators also have a secondary containment system with leak detection, to capture fuel in the event of fuel leakage from the engines of the fuel supply pipework. In the event of a leak being detected the engine is automatically switched off.

3.7 Energy

3.7.1 Basic energy efficiency measures

The efficiency of the temporary generators, during the commissioning and the regular maintenance of the generators the combustion process will be optimised and checked regularly, in line with the generator maintenance schedules, see Annex P1 and P2X of the permit application documents. This will ensure the generators are operating at their maximum efficiency.

The generators will be operated by SCADA automatic management software. They will be operated on an energy demand basis, as the power requirements for the papermill change. This means that the fuel consumed will reflect the power demand from the papermill, avoiding unnecessary consumption of fuel.

A power demand survey of the papermill operations identified that the minimum power demand required while the papermill is still able to operate is 7.5 MW, as an hourly average. While it is not proposed to reduce the overall energy demand, to reduce the potential for air quality impacts the hourly power demand will be managed to maintain this level to below 7.5MW as described in Section 3.2.3. Because the power demand is characteristically varied a 1MW battery will be used to level off the variations in the maximum power supply required from the generators, by supplementing the peaks with stored power from the battery. This will make the operation of the generator more consistent and therefore the fuel use and emission more efficient.

The wider site is operated in line with measures set out in the site Environment and Energy Management Manual, written in accordance with both ISO14001:2015 and ISO 50001:2018

3.7.2 Changes to energy your activities use and create.

In response to Application form C3, Qu 6c.

The variation in the permitted activities will not change the energy demand or efficiency of the wider paper mill. This permit variation application responses to the potential loss of the energy supply from the Baglan Power Station which would require temporary emergency generator to provide power to the installation, prior to the permanent grid connection.

The efficiency of the energy generation when comparing the Baglan Power Station combined cycle gas turbine to the temporary gas and diesel generators will certainly reduce significantly, however this is a temporary situation and due to the emergency nature of the situation.

3.7.3 Climate change levy agreement

In response to Application form C3, Qu6.

Sofidel UK Baglan entered into a CCA in August 2019 following the merger of the UK companies (Sofidel UK and Intertissue). Prior to this Intertissue had its own agreement from 2013. The variation does not affect the agreement

3.7.4 Energy Efficiency Directive requirements

In response to Application form C3, Qu7.

Paragraph 7(2), Schedule 24 of the Environmental Permitting Regulations identified that generators that were in operation immediately prior to 21st March 2015 are exempt from requiring a cogeneration installation cost benefit analysis.

All mobile diesel generators are therefore exempt, on the basis of the date that there were first bought into operation, see Section 1.5, as are the existing boiler and the gas-fired paper drier.

The combined capacity of the new generators are below 20MWth and therefore also do not require a cogeneration installation cost benefit analysis.

3.8 Monitoring

In response to Application form C3, Qu4.

During the commissioning of the generators the Commissioning Engineer optimises the efficiency of the generators for power generation and fuel use and in doing so reduces the emission from the generator. Monitoring of the emissions is used during this as a measure of the tuning, however ongoing monitoring is not typically continued in temporary emergency generators during operation. The monitoring point is located within the engine compartment.

Diesel generators have a different commissioning process and don`t need to be tuned so no emission sampling point is available. Again, monitoring of the generators emissions is not typically carried out on temporary emergency generators and a sampling point is therefore not available.

Instead of monitoring air emissions, it is proposed to measure the power generated as a surrogate to a measure of emissions. By limiting the power produced by the generators this would limit the emissions. This has specifically been linked to the emission of NOx, the key emission from the generators in relation to human health.

The generators operating on a ‘power on demand’ basis are not expected to exceed a maximum hourly average power output of 7.5 MW electrical output. This has been shown by the air dispersion modelling to limit the risk of air pollution at sensitive receptors, as set out in Annex G the Air Quality assessment report.

The generator SCADA system will monitor and record the power generation on a continual basis. Based on historical paper mill power demand the generator operating on a power on demand basis would not exceed this limit. Records will be reviewed on a daily basis and can be shared with NRW as required to demonstrate power demand and therefore assumed NOx emission.