Review of an Environmental Permit for an Installation subject to Chapter II of the Industrial Emissions Directive under the Environmental Permitting (England & Wales) Regulations 2016 (as amended)

Decision document recording our decision-making process following review of a permit

The Permit number is:	EPR/BX2108IQ
The Operator is:	British Sugar PLC
The Installation is:	Wissington Sugar Factory
This Variation Notice number is:	EPR/BX2108IQ/V011

What this document is about

Article 21(3) of the Industrial Emissions Directive (IED) requires the Environment Agency to review conditions in permits that it has issued and to ensure that the permit delivers compliance with relevant standards, within four years of the publication by the European Commission of updated decisions on best available techniques (BAT) Conclusions.

We have reviewed the permit for this installation against the BAT Conclusions for the Food, Drink and Milk Industries published on 4th December 2019 in the Official Journal of the European Union. In this decision document, we set out the reasoning for the consolidated variation notice that we have issued.

It explains how we have reviewed and considered the techniques used by the Operator in the operation and control of the plant and activities of the installation. It is our record of our decision-making process and shows how we have taken into account all relevant factors in reaching our position.

As well as considering the review of the operating techniques used by the Operator for the operation of the plant and activities of the installation, the consolidated variation notice takes into account and brings together in a single document all previous variations that relate to the original permit issue. Where this has not already been done, it also modernises the entire permit to reflect the conditions contained in our current generic permit template.

The introduction of new template conditions makes the Permit consistent with our current general approach and with other permits issued to Installations in this sector. Although the wording of some conditions has changed, while others have been deleted because of the new regulatory approach, it does not reduce the level of environmental protection achieved by the Permit in any way. In this document, we therefore address only our determination of substantive issues relating to the new BAT Conclusions.

We try to explain our decision as accurately, comprehensively and plainly as possible. Achieving all three objectives is not always easy, and we would welcome any feedback as to how we might improve our decision documents in future.

How this document is structured

1. Our decision
2. How we reached our decision
3. The legal framework
4. Annex 1 – Review of operating techniques within the Installation against any relevant BAT Conclusions.
5. Annex 2 – Review and assessment of changes that are not part of the BAT Conclusions derived permit review
6. Annex 3 – Improvement Conditions

1 Our decision

We have decided to issue the Variation Notice to the Operator. This will allow the Operator to continue to operate the Installation, subject to the conditions in the Consolidated Variation Notice that updates the whole permit.

We consider that, in reaching our decision, we have taken into account all relevant considerations and legal requirements and that the varied permit will ensure that a high level of protection is provided for the environment and human health.

The Consolidated Variation Notice contains many conditions taken from our standard Environmental Permit template including the relevant annexes. We developed these conditions in consultation with industry, having regard to the legal requirements of the Environmental Permitting Regulations and other relevant legislation. This document does not therefore include an explanation for these standard conditions. Where they are included in the Notice, we have considered the techniques identified by the operator for the operation of their installation, and have accepted that the details are sufficient and satisfactory to make those standard conditions appropriate. This document does, however, provide an explanation of our use of "tailor-made" or installation-specific conditions, or where our Permit template provides two or more options.

2 How we reached our decision

2.1 Requesting information to demonstrate compliance with BAT Conclusion techniques

We issued a Notice under Regulation 61(1) of the Environmental Permitting (England and Wales) Regulations 2016 (a Regulation 61 Notice) on 28/05/2021 requiring the Operator to provide information to demonstrate where the operation of their installation currently meets, or how it will subsequently meet, the revised standards described in the relevant BAT Conclusions documents.

The Notice required that where the revised standards are not currently met, the operator should provide information that:

- describes the techniques that will be implemented before 4 December 2023, which will then ensure that operations meet the revised standards, or
- justifies why standards will not be met by 4 December 2023, and confirmation of the date when the operation of those processes will cease within the Installation or an explanation of why the revised BAT standards are not applicable to those processes, or
- justifies why an alternative technique will achieve the same level of environmental protection equivalent to the revised BAT standards described in the BAT Conclusions.

Where the Operator proposed that they were not intending to meet a BAT standard that also included a BAT Associated Emission Level (BAT-AEL) described in the BAT Conclusions Document, the Regulation 61 Notice required that the Operator make a formal request for derogation from compliance with that BAT-AEL (as provisioned by Article 15(4) of IED). In this circumstance, the Notice identified that any such request for derogation must be supported and justified by sufficient technical and commercial information that would enable us to determine acceptability of the derogation request.

The Regulation 61 Notice response from the Operator was received on 23/11/2021.

We considered that the response did not contain sufficient information for us to commence determination of the permit review. We therefore issued a further information request to the Operator. Suitable further information was provided by the Operator on 07/02/2022.

We considered it was in the correct form and contained sufficient information for us to begin our determination of the permit review.

The Operator made no claim for commercial confidentiality. We have not received any information in relation to the Regulation 61 Notice response that appears to be confidential in relation to any party.

2.2 Review of our own information in respect to the capability of the Installation to meet revised standards included in the BAT Conclusions document

Based on our records and previous experience in the regulation of the installation we have no reason to consider that the Operator will not be able to comply with the techniques and standards described in the BAT Conclusions.

2.3 Other considerations

We have addressed any other key issues for the sector as part of this review process.

3 The legal framework

The Consolidated Variation Notice will be issued under Regulations 18 and 20 of the EPR. The Environmental Permitting regime is a legal vehicle which delivers most of the relevant legal requirements for activities falling within its scope. In particular, the regulated facility is:

- an *installation* as described by the IED;
- subject to aspects of other relevant legislation which also have to be addressed.

We consider that, in issuing the Consolidated Variation Notice, it will ensure that the operation of the Installation complies with all relevant legal requirements and that a high level of protection will be delivered for the environment and human health.

We explain how we have addressed specific statutory requirements more fully in the rest of this document.

Annex 1: decision checklist regarding relevant BAT Conclusions

BAT Conclusions for the Food, Drink and Milk Industries, were published by the European Commission on 4 December 2019.

There are 37 BAT Conclusions.

BAT 1 – 15 are General BAT Conclusions (Narrative BAT) applicable to all relevant Food, Drink and Milk Installations in scope.

BAT 16 – 37 are sector-specific BAT Conclusions, including Best Available Techniques Associated Emissions Levels (BAT-AELs) and Associated Environmental Performance Levels (BAT-AEPLs):

BAT 16 & 17	BAT Conclusions for Animal Feed
BAT 18 – 20	BAT Conclusions for Brewing
BAT 21 – 23	BAT Conclusions for Dairies
BAT 24	BAT Conclusions for Ethanol Production
BAT 25 & 26	BAT Conclusions for Fish and Shellfish Processing
BAT 27	BAT Conclusions for Fruit and Vegetable Processing
BAT 28	BAT Conclusions for Grain Milling
BAT 29	BAT Conclusions for Meat Processing
BAT 30 – 32	BAT Conclusions for Oilseed Processing and Vegetable Oil Refining
BAT 33	BAT Conclusions for Soft Drinks and Nectar/Fruit Juice Processed from Fruit and Vegetables
BAT 34	BAT Conclusions for Starch Production
BAT 35 – 37	BAT Conclusions for Sugar Manufacturing

In addition to the BAT Conclusions for the Food, Drink and Milk Industries; the following BAT Conclusions also apply (as “secondary” BREF BAT Conclusions) due to the site activities:

- Large Combustion Plant (LCP) BAT Conclusions, published 17 August 2017 (relevant to FDM sites operating LCP):

BAT 1 – 17 (General BAT Conclusions), BAT 28 – 30 and BAT 40 – 45.

- Cement & Lime BAT Conclusions, published 9 April 2013 (relevant to FDM sites undertaking lime production):

BAT 1, 2, 30 – 54.

- Waste Treatment BAT Conclusions, published 10 August 2018 (relevant to FDM sites undertaking Anaerobic Digestion).

BAT 15, 16, 21 & 38.

This annex provides a record of decisions made in relation to each relevant BAT Conclusion applicable to the installation. This annex should be read in conjunction with the Consolidated Variation Notice.

The overall status of compliance with the BAT conclusion is indicated in the table as:

NA – Not Applicable
CC – Currently Compliant
FC – Compliant in the future (within 4 years of publication of BAT Conclusions)
NC – Not Compliant

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td colspan="2">GENERAL BAT CONCLUSIONS (BAT 1-15)</td><td></td><td></td></tr>
<tr><td>1</td><td>Environmental Management System - Improve overall environmental performance.

Implement an EMS that incorporates all the features as described within BATc 1.</td><td>CC</td><td>The operator has a EMS externally accredited to the ISO14001 standard which takes into account all relevant requirements to improve overall environmental performance.</td></tr>
<tr><td>2</td><td>EMS Inventory of inputs & outputs. Increase resource efficiency and reduce emissions.

Establish, maintain and regularly review (including when a significant change occurs) an inventory of water, energy and raw materials consumption as well as of waste water and waste gas streams, as part of the environmental management system (see BAT 1), that incorporates all of the features as detailed within the BATCs.</td><td>CC</td><td>The operator has a EMS externally accredited to the ISO14001 standard which takes into account all relevant requirements to increase resource efficiency and reduce emissions.</td></tr>
<tr><td>3</td><td>Monitoring key process parameters at key locations for emissions to water.
For relevant emissions to water as identified by the inventory of waste water streams (see BAT 2), BAT is to monitor key process parameters (e.g. continuous monitoring of waste water flow, pH and temperature) at key locations (e.g. at the inlet and/or outlet of the pre-treatment, at the inlet to the final treatment, at the point where the emission leaves the installation).</td><td>CC</td><td>The operator ensures that key process parameters are monitored continuously on the site’s wastewater plant. This includes all incoming feeds, intermediate and outlets from the plant.
All data collected from the waste water treatment plant is used to generate a daily report that trends key parameters such as F:M ratio, sludge age, COD/TN removal efficiencies, this enables plant performance to be effectively managed.</td></tr>
<tr><td>4</td><td>Monitoring emissions to water to the required frequencies and standards.
BAT is to monitor emissions to water with at least the frequency given [refer to BAT 4 table in BATc] and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>FC</td><td>The operator proposed the following frequency for monitoring:
Table 1: Wastewater monitoring scheduele – current as defined in permit and proposed
<table><tr><th>Parameter</th><th>Current Sampling Schedule</th><th>Proposed Sampling Scheduele</th></tr><tr><td>BOD</td><td>Weekly</td><td>Weekly</td></tr><tr><td>COD</td><td>None</td><td>3 times per week</td></tr><tr><td>TSS</td><td>Daily</td><td>Daily</td></tr><tr><td>TN</td><td>None</td><td>3 times per week</td></tr><tr><td>TP</td><td>None</td><td>3 times per week</td></tr><tr><td>NH3</td><td>Daily</td><td>Daily</td></tr><tr><td>Iron</td><td>Weekly</td><td>Weekly</td></tr><tr><td>pH</td><td>Daily</td><td>Daily</td></tr><tr><td>Chloride</td><td>None</td><td>Monthly</td></tr><tr><td>Phosphate</td><td>None</td><td>3 times per week</td></tr></table>British Sugar currently monitors COD and not TOC.</td></tr>
</table>

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
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<tr><td></td><td></td><td></td><td>A reduced frequency is only acceptable where an operator can demonstrate that their effluent is suitably stable.
In this case, we have applied the requirements as per the BATc's.</td></tr>
<tr><td>5</td><td>Monitoring channelled emissions to air to the required frequencies and standards.
BAT is to monitor channelled emissions to air with at least the frequency given and in accordance with EN standards.</td><td>FC</td><td>The previous permit requirements are as follows:

Wissington's current monitoring schedule is below:
Table S3.1(b) Point source emissions to air from non LCP plant<table><tr><th>Emission point ref. & location</th><th>Parameter</th><th>Source</th><th>Limit (including unit) these limits do not apply during start up or shut down</th><th>Reference period</th><th>Monitoring frequency</th><th>Monitoring standard or method</th></tr><tr><td>A52</td><td rowspan="3">Sulphur Dioxide</td><td>#1 dryer flue duct abated by cyclones when firing on gas</td><td rowspan="3">65 mg/Nm³</td><td rowspan="3">4 hour period expressed as 15 minute average</td><td rowspan="3">Annual</td><td rowspan="3">BS EN 6069-4.4:1993</td></tr><tr><td>A53</td><td>#2 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A54</td><td>#3 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A52</td><td rowspan="3">Oxides of Nitrogen (NO and NO_2 expressed as NO_2)</td><td>#1 dryer flue duct abated by cyclones when firing on gas</td><td rowspan="3">180 mg/Nm³</td><td rowspan="3">4 hour period expressed as 30 minute average</td><td rowspan="3">Annual</td><td rowspan="3">BS ISO 10849</td></tr><tr><td>A53</td><td>#2 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A54</td><td>#3 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A52</td><td rowspan="3">Carbon Monoxide</td><td>#1 dryer flue duct abated by cyclones when firing on gas</td><td rowspan="3">3500 mg/Nm³</td><td rowspan="3">4 hour period expressed as 10 minute average</td><td rowspan="3">Annual</td><td rowspan="3">BS ISO12039</td></tr><tr><td>A53</td><td>#2 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A54</td><td>#3 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A52</td><td rowspan="3">Total Particulate</td><td>#1 dryer flue duct abated by cyclones when firing on gas</td><td rowspan="3">150 mg/Nm³</td><td rowspan="3">Minimum of 1-hour period</td><td rowspan="3">Annual</td><td rowspan="3">BS EN 13284-1 or BS ISO9096</td></tr><tr><td>A53</td><td>#2 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A54</td><td>#3 dryer flue duct abated by cyclones when firing on gas</td></tr><tr><td>A55</td><td>-</td><td>Pellet cooler cyclone vents</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>
The operator proposed the following monitoring schedule:
Table 2: Air emissions monitoring schedule – current as defined in permit and proposed<table><tr><td colspan="3">Animal Feed Dryers (A52, A53, A54)</td></tr><tr><td>Parameter</td><td>Current Sampling requirements</td><td>Proposed Sampling Requirements</td></tr><tr><td>Dust</td><td>Annual</td><td>Monthly</td></tr><tr><td>PM2.5 and PM10</td><td>None</td><td>Annual</td></tr><tr><td>TVOC</td><td>None</td><td>Annual</td></tr><tr><td>NOx</td><td>Annual</td><td>Annual</td></tr><tr><td>CO</td><td>Annual</td><td>Annual</td></tr><tr><td>SOx</td><td>Annual</td><td>Annual</td></tr><tr><td colspan="3">Pellet Collers (A55)</td></tr><tr><td>Dust</td><td>None</td><td>Annual</td></tr></table>
In this case, we have applied the requirements as per the BATc's.</td></tr>
<tr><td>6</td><td>Energy Efficiency
In order to increase energy efficiency, BAT is to use an energy efficiency plan (BAT 6a) and an appropriate combination of the common techniques listed in technique 6b within the table in the BATc.</td><td>CC</td><td>The operator has a ISO50001 accredited Energy Management System, with targets for energy reduction at critical energy intensive stages of the process. Energy consumption and targets are monitored, reported and reviewed on a regular basis.</td></tr>
</table>

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7	**Water and wastewater minimisation** In order to reduce water consumption and the volume of waste water discharged, BAT is to use BAT 7a and one or a combination of the techniques b to k given below. (a) water recycling and/or reuse (b) Optimisation of water flow (c) Optimisation of water nozzles and hoses (d) Segregation of water streams Techniques related to cleaning operations: (e) Dry cleaning (f) Pigging system for pipes (g) High-pressure cleaning (h) Optimisation of chemical dosing and water use in cleaning-in-place (CIP) (i) Low-pressure foam and/or gel cleaning (j) Optimised design and construction of equipment and process areas (k) Cleaning of equipment as soon as possible	**CC**	The operator uses all the techniques listed at appropriate stages of the process, and the water usage is monitored frequently. Key measures include: Water recycling and/or re-use - Sugar beet is 75% water, this water is stored and reused all over the site in multiple applications. Optimisation of water nozzles & hoses - Nozzles and hoses are used on many applications, including sugar beet cleaning/washing sprays. Dry cleaning, high pressure cleaning and cleaning in place.
8	**Prevent or reduce the use of harmful substances** In order to prevent or reduce the use of harmful substances, e.g. in cleaning and disinfection, BAT is to use one or a combination of the techniques given below. (a) Proper selection of cleaning chemicals and/or disinfectants (b) Reuse of cleaning chemicals in cleaning-in-place (CIP) (c) Dry cleaning (d) Optimised design and construction of equipment and process areas [for detail of each technique, refer BAT 8 table in BATc]	**CC**	The processes on site employ very high temperatures and therefore the need to for cleaning and in particular Cleaning In Place (CIP) is minimal. The primary aim of the cleaning techniques employed is for descaling process plant. Where plant can safely be isolated from the process stream, e.g. heat exchangers, this will be carried out using high pressure water jetting. Where plant cannot be taken offline, cleaning is caried out at the end of operational periods using chemicals, namely sodium hydroxide or sodium carbonate and EDTA. EDTA is selected due to its effectiveness in cleaning the types of scale found in the sugar manufacturing process equipment, in particular calcium oxalate and is related to process chemistry. The amount of chemicals used is carefully monitored during the cleaning cycle and when the chemical

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			levels reach constant concentration then the cleaning is considered to be finished. This activity tends to be carried out once per year at the end of the beet campaign. Halogenated biocides are used for biological control in water systems, generally for control of Legionella. Their use is carefully controlled based on targeted minimum residual levels of halogen and microbiological analysis to minimise health and safety risk. A number of chemicals used in sugar manufacturing historically, namely sulphuric acid, hydrochloric acid, caustic soda and sodium hypochlorite contained traces of cadmium and mercury by virtue of the manufacturing processes employed. These manufacturing techniques are now generally phased out and as a result, these chemicals are produced using techniques that do not give rise to contamination with cadmium or mercury and only appropriately sourced chemicals are used. Supplier analysis is received on a quarterly basis and shows mercury and cadmium levels are below the limits of detection.
9	**Refrigerants** In order to prevent emissions of ozone-depleting substances and of substances with a high global warming potential from cooling and freezing, BAT is to use refrigerants without ozone depletion potential and with a low global warming potential.	**CC**	The operator does not use large-scale cooling; and the majority of cooling across their operational sites is provided by evaporative cooling. However, the Operator has demonstrated a detailed understanding of the requirements of BAT 9 and has stated that all new refrigeration systems will use refrigerants with the lowest practical GWP. As with end of life system replacements, ultra-low GWP refrigerants would be used wherever possible.
10	**Resource efficiency**	**CC**	British Sugar operates on a very resource efficient basis. Once the sugar is extracted

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	In order to increase resource efficiency, BAT is to use one or a combination of the techniques given below: (a) Anaerobic digestion (b) Use of residues (c) Separation of residues (d) Recovery and reuse of residues from the pasteuriser (e) Phosphorus recovery as struvite (f) Use of waste water for land spreading		from the sugar beet the residual beet pulp is either marketed as animal feed, either pressed (wet) or dried dependant on local markets or the pressed pulp can be used as an anaerobic digestion feedstock to produce methane. The sugar extracted from the beet is then purified by removal of impurities using lime and then crystallisation. The lime used for impurity removal is sold as an agricultural liming agent. The sugar will either be sold as crystal or low grade sugar syrup e.g. molasses. Impurities such as betaine are removed from the sugar syrup to be sold into the animal feed or cosmetics markets. The soil washed from the sugar beet is sold to as Topsoil for multipurpose use. Techniques d, e and f are not applicable to British Sugar as none of these descriptions or applicability are related to British Sugar's manufacturing process or activities that are carried out. British Sugar monitors and reports on the usage of all raw materials on a detailed basis. Monitoring of the main process raw materials and additives is reviewed at daily and weekly technical meetings. The majority of raw materials are reported based on the quantity of sugar beet processed to form KPI's.
11	**Waste water buffer storage** In order to prevent uncontrolled emissions to water, BAT is to provide an appropriate buffer storage capacity for waste water.	**CC**	The operator utilises wastewater storage ponds that are designed to have the required volume to allow for initial settlement of the soil which comes in with the sugar beet raw material, and subsequent mixing of wastewater streams from the manufacturing process to prevent variability in pollutant strength and pH prior to the wastewater being sent to the onsite wastewater treatment plant. In addition, the system capacity allows for surges in wastewater flows which may occur

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			from time to time, due either to process changes or climatic conditions.
12	**Emissions to water – treatment** In order to reduce emissions to water, BAT is to use an appropriate combination of the techniques given below. Preliminary, primary and general treatment (a) Equalisation (b) Neutralisation (c) Physical separate (eg screens, sieves, primary settlement tanks etc) Aerobic and/or anaerobic treatment (secondary treatment) (d) Aerobic and/or anaerobic treatment (eg activated sludge, aerobic lagoon etc) (e) Nitification and/or denitrification (f) Partial nitration - anaerobic ammonium oxidation Phosphorus recovery and/or removal (g) Phosphorus recovery as struvite (h) Precipitation (i) Enhanced biological phosphorus removal Final solids removal (j) Coagulation and flocculation (k) Sedimentation (l) Filtration (eg sand filtration, microfiltration, ultrafiltration) (m) Flotation	**CC**	The operator employs the following techniques: • Equalisation (different wastewater streams are homogeneously mixed) • Physical separation (tails screens, ponds themselves, interceptors) • Aerobic and/or anaerobic treatment • Nitrification and dentification • Final Solids removal by coagulation and flocculation, sedimentation. Site wastewater treatment systems have developed over time to meet processing requirements and improvements required to meet legislative requirements for discharge to the relevant receiving waters. Although some of the carbon load (COD) is naturally treated within the ponds over long term storage, the majority of COD reduction is carried out on site using anaerobic digestion and aerobic treatment. A proportion of the water treated by the anaerobic digester is returned to the sugar beet fluming circuit to control pH, but the surplus is passed to anoxic/aerobic treatment which in addition to COD removal will provide for ammoniacal nitrogen and total nitrogen reduction via nitrification/denitrification. Mixed liquor (water and biomass) from the aerobic treatment process is passed to settlement clarifiers to remove biomass (suspended solids) which is returned to the anoxic/aerobic treatment process. Wastewater from the sugar process typically contains only small amounts of phosphorus therefore phosphorous removal is not required. Wissington has a final settlement pond prior to

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			consented discharge, these effectively provide a final solids settlement.
12	**Emissions to water – treatment** **BAT-associated emission levels (BAT-AELs) for direct emissions to a receiving water body** Parameter | BAT-AEL (1) (2) (daily average) Chemical oxygen demand (COD) (3) (4) | 25-100 mg/l (5) Total suspended solids (TSS) | 4-50 mg/l (6) Total nitrogen (TN) | 2-20 mg/l (7) (8) Total phosphorus (TP) | 0,2-2 mg/l (9)	**FC**	British Sugar proposes that both abatement efficiencies are set on a yearly average basis with the year starting at the beginning of the annual beet campaign (generally September/October), once the effluent treatment plant has progressed through the start-up period and is fully operational, as defined in procedure WIS-EMS-LP-16. Analytical data from periods of OTNOC will be excluded from the calculation of abatement efficiency, however should the final effluent quality fall outside permit limits discharge will be stopped and the effluent will be recycled until compliance with limits is achieved at which stage discharge will be resumed: COD < 95% efficiency = 100 mg/l COD ≥ 95% efficiency = 155 mg/l TN < 80% efficiency = 20 mg/l TN ≥ 80% efficiency = 30 mg/l TSS ≤ 50 mg/l TP = ≤ 2 mg/l
13	**Noise management plan** In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to set up, implement and regularly review a noise management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements: - a protocol containing actions and timelines; - a protocol for conducting noise emissions monitoring; - a protocol for response to identified noise events, eg complaints; - a noise reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures. **Note: BAT 13 is only applicable where a noise nuisance at sensitive receptors is expected and/or has been substantiated.**	**CC**	The operator has a noise management plan as part of its environmental management system. Noise is monitored regularly for occupational health reasons and there is a procedure for managing complaints.

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
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<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>14</td><td>Noise management
In order to prevent or, where that is not practicable, to reduce noise emissions, BAT is to use one or a combination of the techniques given below.
(a) Appropriate location of equipment and buildings
(b) Operational measures
(c) Low-noise equipment
(d) Noise control equipment
(e) Noise abatement</td><td>CC</td><td>The operator employs the following techniques to minimise noise for occupational health reasons and to reduce off site noise impacts:
• Regard for the appropriate location of equipment & buildings at design stage
• Operational measures, such as having a regard for noise impact of operations and mitigating as appropriate.
• Using low-noise rated equipment, where possible.</td></tr>
<tr><td>15</td><td>Odour Management
In order to prevent or, where that is not practicable, to reduce odour emissions, BAT is to set up, implement and regularly review an odour management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:
- a protocol containing actions and timelines;
- a protocol for conducting odour monitoring.
- a protocol for response to identified odour incidents eg complaints;
- an odour prevention and reduction programme designed to identify the source(s); to measure/estimate odour exposure: to characterise the contributions of the sources; and to implement prevention and/or reduction measures.
Note: BAT 15 is only applicable to cases where an odour nuisance at sensitive receptors is expected and/or has been substantiated.</td><td>CC</td><td>The operator has provided information to support compliance with BATc 15. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 15.
The Operator has an odour management plan as part of its environmental management system. Odour is monitored regularly and there is a procedure for managing complaints</td></tr>
<tr><td></td><td>ANIMAL FEED SECTOR BAT CONCLUSIONS (BAT 17)</td><td></td><td></td></tr>
<tr><td>17</td><td>Emissions to air – particulates
In order to reduce channelled dust emissions to air, BAT is to use one of the techniques given; a. bag filter, b. cyclone.
<table>
<tr><th rowspan="2">Parameter</th><th rowspan="2">Specific process</th><th rowspan="2">Unit</th><th colspan="2">BAT-AEL
(average over the sampling period)</th></tr>
<tr><th>New plants</th><th>Existing plants</th></tr>
<tr><td>Dust</td><td>Grinding</td><td>mg/Nm^3</td><td><2-5</td><td><2-10</td></tr>
</table></td><td>CC</td><td>The site has eight pellet coolers, and the operator has provided emissions monitoring data which demonstrates that the BAT-AELs can be met.
On that basis, we have included revised ELVs in the permit.</td></tr>
</table>

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	Pellet cooling | <2-20		
	SUGAR SECTOR BAT CONCLUSIONS (BAT 35 – 37)		
35	**Energy efficiency** In order to increase energy efficiency, BAT is to use an appropriate combination of the techniques specified in BAT 6 and of the techniques given below: Technique | Description | Applicability (a) Pressing of beet pulp | The beet pulp is pressed to a dry matter content of typically 25-32 wt-%. | Generally applicable. (b) Indirect drying (steam drying) of beet pulp | Drying of beet pulp by the use of superheated steam. | May not be applicable to existing plants due to the need for a complete reconstruction of the energy facilities. (c) Solar drying of beet pulp | Use of solar energy to dry beet pulp. | May not be applicable due to local climatic conditions and/or lack of space. (d) Recycling of hot gases | Recycling of hot gases (e.g. waste gases from the dryer, boiler or combined heat and power plant). | Generally applicable. (e) Low-temperature (pre)drying of beet pulp | Direct (pre)drying of beet pulp using drying gas, e.g. air or hot gas.	**CC**	The operator has provided information to support compliance with BATc 35. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with BATc 35. The operator employs the following techniques to ensure maximum energy efficiency: • Pulp pressing – The site has a highly optimised pulp pressing station, comprised of seven pulp presses, which aims to achieve the best possible pressing and maximise the dry matter of the pressed pulp. The pressing station is maintained every year following the completion of the beet processing campaign. The average pressed pulp dry substance achieved at over the past 4 campaigns ranges from 26.77 - 28.09% • Recycling of hot gases – One of Wissington's three dryers has flue-gas recycle. • Low temperature (pre-drying) of beet pulp - British Sugar has previously assessed the technical feasibility and economic viability of installing such technology. The opportunities to do so are somewhat limited by the already very good energy efficiency and utilisation of waste heat in the factories. The Operator states that steam drying is not applicable as it would need to be retrofitted. This would require a complete re-design of the current energy balance and configuration of

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td></td><td></td><td>the factory, and that solar drying is not feasible due to UK climatic conditions. However, steam drying would significantly reduce the emissions of particulates. We would expect the operator to consider this as part of an overall review, as imposed by IC5</td></tr>
<tr><td>AEPL</td><td>Table 28
Indicative environmental performance level for specific energy consumption<table><tr><th>Specific process</th><th>Unit</th><th>Specific energy consumption (yearly average)</th></tr><tr><td>Sugar beet processing</td><td>MWh/tonne of beets</td><td>0,15-0,40 (1)</td></tr></table>(1) The upper end of the range may include the energy consumption of the lime kilns and dryers.</td><td>CC</td><td>The operator has provided information to support compliance with AEPL for specific energy consumption. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the AEPL.
The data provided by the operator, obtained for 2018, 2019 & 2020 demonstrates that the specific energy consumption for the site, 0.34 – 0.37 MWh/tonne of beets, falls within the specified range.
Note: All data includes heat and electricity to sugar process, animal feed drying and lime kilns</td></tr>
<tr><td>AEPL</td><td>13.2. Water consumption and waste water discharge
General techniques to reduce water consumption and the volume of waste water discharged are given in Section 1.4 of these BAT conclusions. The indicative environmental performance level is presented in the table below.
Table 29
Indicative environmental performance level for specific waste water discharge<table><tr><th>Specific process</th><th>Unit</th><th>Specific waste water discharge (yearly average)</th></tr><tr><td>Sugar beet processing</td><td>m³/tonne of beets</td><td>0,5-1,0</td></tr></table></td><td>CC</td><td>The operator has provided information to support compliance with AEPL for specific waste water discharge. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the AEPL.
The data provided by the operator, obtained for 2018, 2019 & 2020 demonstrates that the specific waste water discharge for the site, 0.46 – 0.55 m^3/tonne of beets, falls within the specified range.</td></tr>
<tr><td>36</td><td>In order to prevent or reduce channelled dust emissions to air from beet pulp drying, BAT is to use one or a combination of the techniques given below:</td><td>CC</td><td>The operator has provided information to support compliance with BATc 36. We have assessed the information provided and we are</td></tr>
</table>

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>(a)</td><td>Use of gaseous fuels</td><td rowspan="3">See Section 14.2.</td><td>May not be applicable due to the constraints associated with the availability of gaseous fuels.</td></tr>
<tr><td>(b)</td><td>Cyclone</td><td rowspan="2">Generally applicable.</td></tr>
<tr><td>(c)</td><td>Wet scrubber</td></tr>
<tr><td>(d)</td><td>Indirect drying (steam drying) of beet pulp</td><td>See BAT 35b.</td><td>May not be applicable to existing plants due to the need for a complete reconstruction of the energy facilities.</td></tr>
<tr><td>(e)</td><td>Solar drying of beet pulp</td><td>See BAT 35c.</td><td>May not be applicable due to local climatic conditions and/or lack of space.</td></tr>
<tr><td>(f)</td><td>Low-temperature (pre)drying of beet pulp</td><td>See BAT 35e.</td><td>Generally applicable.</td></tr>
</table>
The associated monitoring is given in BAT 5.
</td><td></td><td>satisfied that the operator has demonstrated compliance with BATc 36.
The Operator employs the following techniques:
Use of gaseous fuels: Wissington’s dryers run on natural gas
Cyclones: Wissington’s three dryers all have cyclones to removes dust from the flue gas.</td></tr>
<tr><td></td><td>BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C)
Table 30
BAT-associated emission level (BAT-AEL) for channelled dust emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C)
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL (average over the sampling period)</th><th>Reference oxygen level (O_R)</th><th>Reference gas condition</th></tr>
<tr><td>Dust</td><td>mg/Nm^3</td><td>5-100</td><td>16 vol-%</td><td>No correction for water content</td></tr>
</table>
The associated monitoring is given in BAT 5.</td><td>CC</td><td>The operator has provided information to support compliance with the BAT-AEL. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BAT-AEL.

Emissions data provided for the period 2016 - 2022 demonstrates that emissions of dust from high temperature beet pulp drying is within the specified range at 16% O2, with a max emission of 79 mg/m^3.
Note: Current site permit references to 17% O2
On that basis, we will impose an ELV of 80 mg/m^3 on emission points A52 (Dryer 1), A53 (Dryer 2) and A54 (Dryer 3) from effective date of permit.</td></tr>
</table>

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Food, Drink and Milk Industries</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>37</td><td>In order to reduce channelled SOX emissions to air from high-temperature beet pulp drying (above 500 °C), BAT is to use one or a combination of the techniques given below:

<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>(a)</td><td>Use of natural gas</td><td>—</td><td>May not be applicable due to the constraints associated with the availability of natural gas.</td></tr>
<tr><td>(b)</td><td>Wet scrubber</td><td>See Section 14.2.</td><td>Generally applicable.</td></tr>
<tr><td>(c)</td><td>Use of fuels with low sulphur content</td><td>—</td><td>Only applicable when natural gas is not available.</td></tr>
</table></td><td>CC</td><td>The operator has provided information to support compliance with the BATc 37. We have assessed the information provided and we are satisfied that the operator has demonstrated compliance with the BATc 37.

The operator employs the use of natural gas.</td></tr>
<tr><td></td><td>BAT-associated emission level (BAT-AEL) for channelled SOX emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C) when natural gas is not used:

Table 31
BAT-associated emission level (BAT-AEL) for channelled SO_X emissions to air from beet pulp drying in the case of high-temperature drying (above 500 °C) when natural gas is not used
<table>
<tr><th>Parameter</th><th>Unit</th><th>BAT-AEL
(average over the sampling period)
(1)</th><th>Reference oxygen level
(O_R)</th><th>Reference gas condition</th></tr>
<tr><td>SO_X</td><td>mg/Nm³</td><td>30-100</td><td>16 vol-%</td><td>No correction for water content</td></tr>
</table>
(1) When using exclusively biomass as a fuel, emission levels are expected to be at the lower end of the range.

The associated monitoring is given in BAT 5.</td><td>NA</td><td>We are satisfied that the requirements of the BAT-AELs for BATc 37 do not apply, as the operator uses natural gas.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td colspan="4">General</td></tr>
<tr><td>1</td><td>In order to improve the overall environmental performance, BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the features listed in the BATc document.</td><td>CC</td><td>The operator has a EMS externally accredited to the ISO14001 standard which takes into account all relevant requirements to improve overall environmental performance.</td></tr>
<tr><td>2</td><td>BAT is to determine the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the gasification, IGCC and/or combustion units by carrying out a performance test at full load (1), according to EN standards, after the commissioning of the unit and after each modification that could significantly affect the net electrical efficiency and/or the net total fuel utilisation and/or the net mechanical energy efficiency of the unit. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>CC</td><td>The operator has provided a calculation of the efficeny of the plant that demonstrates compliance with the requirements.</td></tr>
<tr><td>3</td><td>BAT is to monitor key process parameters relevant for emissions to air and water including those given below.
<table>
<tr><th>Stream</th><th>Parameter(s)</th><th>Monitoring</th></tr>
<tr><td rowspan="3">Flue-gas</td><td>Flow</td><td>Periodic or continuous determination</td></tr>
<tr><td>Oxygen content, temperature, and pressure</td><td rowspan="2">Periodic or continuous measurement</td></tr>
<tr><td>Water vapour content (3)</td></tr>
<tr><td>Waste water from flue-gas treatment</td><td>Flow, pH, and temperature</td><td>Continuous measurement</td></tr>
</table></td><td>CC</td><td>The operator monitors key flue-gas parameters using a continuous emissions monitor. Flue gas oxygen, temperature, pressure and water vapour are monitored to enable the required correction of emissions to the reporting conditions. Flue-gas flow is calculated from the fuel input for mass emission reporting. The site does not carry out any flue-gas treatment.</td></tr>
<tr><td>4</td><td>BAT is to monitor emissions to air with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>CC</td><td>The operator monitors the required parameters (NOx and CO) continuously in accordance with EN14181</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>5</td><td>BAT is to monitor emissions to water from flue-gas treatment with at least the frequency given below and in accordance with EN standards. If EN standards are not available, BAT is to use ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.</td><td>NA</td><td>The Operator does not undertake flue gas treatment.</td></tr>
<tr><td>6</td><td>In order to improve the general environmental performance of combustion plants and to reduce emissions to air of CO and unburnt substances, BAT is to ensure optimised combustion and to use an appropriate combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Fuel blending and mixing</td><td>Ensure stable combustion conditions and/or reduce the emission of pollutants by mixing different qualities of the same fuel type</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>b.</td><td>Maintenance of the combustion system</td><td>Regular planned maintenance according to suppliers' recommendations</td></tr>
<tr><td>c.</td><td>Advanced control system</td><td>See description in Section 8.1</td><td>The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td></tr>
<tr><td>d.</td><td>Good design of the combustion equipment</td><td>Good design of furnace, combustion chambers, burners and associated devices</td><td>Generally applicable to new combustion plants</td></tr>
<tr><td>e.</td><td>Fuel choice</td><td>Select or switch totally or partially to another fuel(s) with a better environmental profile (e.g. with low sulphur and/or mercury content) amongst the available fuels, including in start-up situations or when back-up fuels are used</td><td>Applicable within the constraints associated with the availability of suitable types of fuel with a better environmental profile as a whole, which may be impacted by the energy policy of the Member State, or by the integrated site's fuel balance in the case of combustion of industrial process fuels.
For existing combustion plants, the type of fuel chosen may be limited by the configuration and the design of the plant</td></tr>
</table></td><td>CC</td><td>The operator employs the techniques below to improve the general environmental performance of its combustion plant and to reduce emissions to air of CO:

Planned regular maintenance is carried out of the plant as per the supplier’s recommendations

Gas turbine utilises a combustion control computer to optimise the combustion process. Supplementary burners are designed to ensure that CO generation is kept to a minimum by controlling exhaust temperatures.

The site gas turbine and waste heat boiler both use natural gas, back up fuel to the heat recovery boiler is low sulphur DFO</td></tr>
<tr><td>7</td><td>In order to reduce emissions of ammonia to air from the use of selective catalytic reduction (SCR) and/or selective non-catalytic reduction (SNCR) for the abatement of NO_X emissions, BAT is to optimise the design and/or operation of SCR and/or SNCR (e.g. optimised reagent to NO_X ratio, homogeneous reagent distribution and optimum size of the reagent drops)</td><td>NA</td><td>This is not applicable as the site does not use selective catalytic/non-catalytic reduction for abatemet.</td></tr>
<tr><td>8</td><td>In order to prevent or reduce emissions to air during normal operating conditions, BAT is to ensure, by appropriate design, operation and maintenance, that the emission abatement systems are used at optimal capacity and availability.</td><td>NA</td><td>This is not applicable as the site does not use any emission abatement systems.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>9</td><td>In order to improve the general environmental performance of combustion and/or gasification plants and to reduce emissions to air, BAT is to include the following elements in the quality assurance/quality control programmes for all the fuels used, as part of the environmental management system (see BAT 1):
(i) Initial full characterisation of the fuel used including at least the parameters listed below and in accordance with EN standards. ISO, national or other international standards may be used provided they ensure the provision of data of an equivalent scientific quality;
(ii) Regular testing of the fuel quality to check that it is consistent with the initial characterisation and according to the plant design specifications. The frequency of testing and the parameters chosen from the table below are based on the variability of the fuel and an assessment of the relevance of pollutant releases (e.g. concentration in fuel, flue-gas treatment employed);
(iii) Subsequent adjustment of the plant settings as and when needed and practicable (e.g. integration of the fuel characterisation and control in the advanced control system (see description in Section 8.1)).
Description
Initial characterisation and regular testing of the fuel can be performed by the operator and/or the fuel supplier. If performed by the supplier, the full results are provided to the operator in the form of a product (fuel) supplier specification and/or guarantee.
<table>
<tr><th>Fuel(s)</th><th>Substances/Parameters subject to characterisation</th></tr>
<tr><td>Natural gas</td><td>— LHV
— CH_4, C_2H_6, C_3, C_4+, CO_2, N_2, Wobbe index</td></tr>
</table></td><td>CC</td><td>The Operator quality assurance/controls:
• Natural gas fuel quality is stable within the UK and is prescribed by the Gas Safety (Management) Regulations (GS(M)R), with regards to Wobbe Index (47.2 – 51.4 MJ/m3 at 15°C, 101.3 kPa, based on the Gross Calorific Value). Most gas turbines and boilers can tolerate this Wobbe Index variation, about the midrange point, but actual variations are currently smaller than this in practice. Natural Gas composition is not prescribed by the GS(M)R and there is some variation in the concentrations of methane, other hydrocarbons, and inert gas components. However, the methane concentration is always above 80%, in compliance with the IED definition of natural gas. The BAT 9 requirement is therefore satisfied by reference to the GS(M)R requirements, for Wobbe Index and typical NCV and compositional variations.
• Regular testing. This is undertaken using a gas chromatograph, based on continuous/discontinuous natural gas sampling. The gas chromatograph is installed on site or by a third party laboratory when</td></tr>
</table>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
			sampling discontinuously. The Net Calorific Value (NCV) and the carbon content of the fuel are calculated from the natural gas composition for EU ETS reporting purposes. Records of NCV and the detailed fuel composition are held on site for additional regulatory inspection as required. The detailed data simply confirms that that the natural gas is within UK specifications and no further characterisation is required. The Wobbe Index can also be calculated from the fuel composition, as required, where not already undertaken. • Subsequent adjustment of plant settings. Gas turbine plants have highly automated control systems and finely tuned combustion systems which are regularly checked and re-tuned to maintain NOx performance. In relation to NCV, the control system adjusts the fuel flow rate until the required firing temperature and power output are achieved, without reference to fuel quality data/based on measurement of the NCV using a local gas chromatograph/fast response calorimeter.

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>10</td><td>In order to reduce emissions to air and/or to water during other than normal operating conditions (OTNOC), BAT is to set up and implement a management plan as part of the environmental management system (see BAT 1), commensurate with the relevance of potential pollutant releases, that includes the following elements:
— appropriate design of the systems considered relevant in causing OTNOC that may have an impact on emissions to air, water and/or soil (e.g. low-load design concepts for reducing the minimum start-up and shutdown loads for stable generation in gas turbines),
— set-up and implementation of a specific preventive maintenance plan for these relevant systems,
— review and recording of emissions caused by OTNOC and associated circumstances and implementation of corrective actions if necessary,
— periodic assessment of the overall emissions during OTNOC (e.g. frequency of events, duration, emissions quantification/estimation) and implementation of corrective actions if necessary.</td><td>CC</td><td>The Operator has a procedure in the sites EMS that considers relevant OTNOC situations:
• Training
• Changing of fuel types
• Periods of combustion failure
• Continuous emissions monitoring
• Fuel quality monitoring</td></tr>
<tr><td>11</td><td>BAT is to appropriately monitor emissions to air and/or to water during OTNOC.
Description
The monitoring can be carried out by direct measurement of emissions or by monitoring of surrogate parameters if this proves to be of equal or better scientific quality than the direct measurement of emissions. Emissions during start-up and shutdown (SU/SD) may be assessed based on a detailed emission measurement carried out for a typical SU/SD procedure at least once every year, and using the results of this measurement to estimate the emissions for each and every SU/SD throughout the year.</td><td>CC</td><td>Emissions to air are monitored on a continuous basis with the sites CEMs unit through OTNOC. Issues with the sites CEM are covered in an EMS procedure</td></tr>
<tr><td>12</td><td>In order to increase the energy efficiency of combustion, gasification and/or IGCC units operated ≥ 1 500 h/yr, BAT is to use an appropriate combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td>See description in Section 8.2.
Optimising the combustion minimises the content of unburnt substances in the flue-gases and in solid combustion residues</td><td rowspan="3">Generally applicable</td></tr>
<tr><td>b.</td><td>Optimisation of the working medium conditions</td><td>Operate at the highest possible pressure and temperature of the working medium gas or steam, within the constraints associated with, for example, the control of NO_X emissions or the characteristics of energy demanded</td></tr>
<tr><td>c.</td><td>Optimisation of the steam cycle</td><td>Operate with lower turbine exhaust pressure by utilisation of the lowest possible temperature of the condenser cooling water, within the design conditions</td></tr>
</table></td><td>CC</td><td>The Operator employs the following techniques:
• Pumps are on invertor drives, planned preventative maintenance is carried out to ensure plant items are run to optimal performance levels.
• Gas turbine plants have highly automated control systems and finely tuned combustion systems which are regularly checked and re-tuned to maintain performance.
• Feed water is preheated before going to the boiler drum.</td></tr>
</table>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	d.	Minimisation of energy consumption	Minimising the internal energy consumption (e.g. greater efficiency of the feed-water pump)			• Heat is recovered from the steam system and used in the sugar manufacturing process. Heat is also recovered from the flue-gas
	e.	Preheating of combustion air	Reuse of part of the heat recovered from the combustion flue-gas to preheat the air used in combustion	Generally applicable within the constraints related to the need to control NO_X emissions		
	f.	Fuel preheating	Preheating of fuel using recovered heat	Generally applicable within the constraints associated with the boiler design and the need to control NO_Xemissions		
	g.	Advanced control system	See description in Section 8.2. Computerised control of the main combustion parameters enables the combustion efficiency to be improved	Generally applicable to new units. The applicability to old units may be constrained by the need to retrofit the combustion system and/or control command system		
	h.	Feed-water preheating using recovered heat	Preheat water coming out of the steam condenser with recovered heat, before reusing it in the boiler	Only applicable to steam circuits and not to hot boilers. Applicability to existing units may be limited due to constraints associated with the plant configuration and the amount of recoverable heat		
	i.	Heat recovery by cogeneration (CHP)	Recovery of heat (mainly from the steam system) for producing hot water/steam to be used in industrial processes/activities or in a public network for district heating. Additional heat recovery is possible from: — flue-gas — grate cooling — circulating fluidised bed	Applicable within the constraints associated with the local heat and power demand. The applicability may be limited in the case of gas compressors with an unpredictable operational heat profile		
	j.	CHP readiness	See description in Section 8.2.	Only applicable to new units where there is a realistic potential for the future use of heat in the vicinity of the unit		
	k.	Flue-gas condenser	See description in Section 8.2.	Generally applicable to CHP units provided there is enough demand for low-temperature heat		
	l.	Heat accumulation	Heat accumulation storage in CHP mode	Only applicable to CHP plants. The applicability may be limited in the case of low heat load demand		

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant				Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	m.	Wet stack	See description in Section 8.2.	Generally applicable to new and existing units fitted with wet FGD		
	n.	Cooling tower discharge	The release of emissions to air through a cooling tower and not via a dedicated stack	Only applicable to units fitted with wet FGD where reheating of the flue-gas is necessary before release, and where the unit cooling system is a cooling tower		
	o.	Fuel pre-drying	The reduction of fuel moisture content before combustion to improve combustion conditions	Applicable to the combustion of biomass and/or peat within the constraints associated with spontaneous combustion risks (e.g. the moisture content of peat is kept above 40 % throughout the delivery chain). The retrofit of existing plants may be restricted by the extra calorific value that can be obtained from the drying operation and by the limited retrofit possibilities offered by some boiler designs or plant configurations		
	p.	Minimisation of heat losses	Minimising residual heat losses, e.g. those that occur via the slag or those that can be reduced by insulating radiating sources	Only applicable to solid-fuel-fired combustion units and to gasification/IGCC units		
	q.	Advanced materials	Use of advanced materials proven to be capable of withstanding high operating temperatures and pressures and thus to achieve increased steam/combustion process efficiencies	Only applicable to new plants		
	r.	Steam turbine upgrades	This includes techniques such as increasing the temperature and pressure of medium-pressure steam, addition of a low-pressure turbine, and modifications to the geometry of the turbine rotor blades	The applicability may be restricted by demand, steam conditions and/or limited plant lifetime		
	s.	Supercritical and ultra-supercritical steam conditions	Use of a steam circuit, including steam reheating systems, in which steam can reach pressures above 220,6 bar and temperatures above 374 °C in the case of supercritical conditions, and above 250 – 300 bar and temperatures above 580 – 600 °C in the case of ultra-supercritical conditions	Only applicable to new units of ≥ 600 MW_{th} operated > 4 000 h/yr. Not applicable when the purpose of the unit is to produce low steam temperatures and/or pressures in process industries. Not applicable to gas turbines and engines generating steam in CHP mode. For units combusting biomass, the applicability may be constrained by high-temperature corrosion in the case of certain biomasses		
13	In order to reduce water usage and the volume of contaminated waste water discharged, BAT is to use one or both of the techniques given below.				CC	The operator employs the following techniques:

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Water recycling</td><td>Residual aqueous streams, including run-off water, from the plant are reused for other purposes. The degree of recycling is limited by the quality requirements of the recipient water stream and the water balance of the plant</td><td>Not applicable to waste water from cooling systems when water treatment chemicals and/or high concentrations of salts from seawater are present</td></tr>
<tr><td>b.</td><td>Dry bottom ash handling</td><td>Dry, hot bottom ash falls from the furnace onto a mechanical conveyor system and is cooled down by ambient air. No water is used in the process.</td><td>Only applicable to plants combusting solid fuels.
There may be technical restrictions that prevent retrofitting to existing combustion plants</td></tr>
</table>
</td><td></td><td>• The plant uses ultra-pure water, the conductivity of the system is monitored continuously using cation columns and blow down rates are then optimised to minimise water losses. Water is also recovered and reused from steam traps. All blow down water from the system goes to the sites centralised wastewater treatment plant before being treated and then discharged to a local river.
Note: Dry bottom ash handling is not applicable as the site does not use solid fuels.</td></tr>
<tr><td>14</td><td>In order to prevent the contamination of uncontaminated waste water and to reduce emissions to water, BAT is to segregate waste water streams and to treat them separately, depending on the pollutant content.
Description
Waste water streams that are typically segregated and treated include surface run-off water, cooling water, and waste water from flue-gas treatment.
Applicability
The applicability may be restricted in the case of existing plants due to the configuration of the drainage systems.</td><td>CC</td><td>The operator operates a centralised wastewater treatment plant. All wastewater streams generated on site are mixed in large buffering lagoons before being treated and then discharged to the river. This means there is no need to separate water streams dependant on their pollutant content. A full description of the wastewater treatment plant is given in the responses to Generic BATC 11 and 12 for FDM.</td></tr>
<tr><td>15</td><td>In order to reduce emissions to water from flue-gas treatment, BAT is to use an appropriate combination of the techniques given, and to use secondary techniques as close as possible to the source in order to avoid dilution.</td><td>NA</td><td>Not applicable.
The site does not carry out any flue-gas treatment</td></tr>
<tr><td>16</td><td>In order to reduce the quantity of waste sent for disposal from the combustion and/or gasification process and abatement techniques, BAT is to organise operations so as to maximise, in order of priority and taking into account life-cycle thinking:
(a) waste prevention, e.g. maximise the proportion of residues which arise as by-products;</td><td>NA</td><td>Not applicable.
The site does not carry out any flue-gas treatment</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>(b) waste preparation for reuse, e.g. according to the specific requested quality criteria;
(c) waste recycling;
(d) other waste recovery (e.g. energy recovery),
by implementing an appropriate combination of techniques.</td><td></td><td></td></tr>
<tr><td>17</td><td>In order to reduce noise emissions, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Operational measures</td><td>These include:
— improved inspection and maintenance of equipment
— closing of doors and windows of enclosed areas, if possible
— equipment operated by experienced staff
— avoidance of noisy activities at night, if possible
— provisions for noise control during maintenance activities</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Low-noise equipment</td><td>This potentially includes compressors, pumps and disks</td><td>Generally applicable when the equipment is new or replaced</td></tr>
<tr><td>c.</td><td>Noise attenuation</td><td>Noise propagation can be reduced by inserting obstacles between the emitter and the receiver. Appropriate obstacles include protection walls, embankments and buildings</td><td>Generally applicable to new plants. In the case of existing plants, the insertion of obstacles may be restricted by lack of space</td></tr>
<tr><td>d.</td><td>Noise-control equipment</td><td>This includes:
— noise-reducers
— equipment insulation
— enclosure of noisy equipment
— soundproofing of buildings</td><td>The applicability may be restricted by lack of space</td></tr>
<tr><td>e.</td><td>Appropriate location of equipment and buildings</td><td>Noise levels can be reduced by increasing the distance between the emitter and the receiver and by using buildings as noise screens</td><td>Generally applicable to new plant</td></tr>
</table></td><td>CC</td><td>The operator employs the following techniques:
• The plant has twice daily audio-visual inspection routes carried out by experienced trained staff to highlight any issues that arise. Conditional based monitoring is used to identify issues early and rectify them.
• The main LCP is located in a building, the gas turbine is its own enclosure.
• The main LCP is located in a building, the gas turbine is its own soundproof enclosure.
• The LCP is located 1.1 km from the nearest sensitive receptor.</td></tr>
<tr><td colspan="4">Combustion of liquid fuels</td></tr>
<tr><td>Table 13</td><td>BAT-associated energy efficiency levels (BAT-AEELs) for HFO and/or gas oil combustion in boilers
<table>
<tr><th>Type of combustion unit</th><th>BAT-AEELs ([99]) ([100])</th></tr>
</table></td><td>NA</td><td>The units do not operate > 1,500 hours/year with these fuels.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th></th><th colspan="2">Net electrical efficiency (%)</th><th colspan="2">Net total fuel utilisation (%) ([101])</th></tr>
<tr><th></th><th>New unit</th><th>Existing unit</th><th>New unit</th><th>Existing unit</th></tr>
<tr><td>HFO- and/or gas-oil-fired boiler</td><td>> 36,4</td><td>35,6–37,4</td><td>80–96</td><td>80–96</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>28</td><td>
In order to prevent or reduce NO_X emissions to air while limiting CO emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Air staging</td><td rowspan="6">See descriptions in Section 8.3</td><td rowspan="2">Generally applicable</td></tr>
<tr><td>b.</td><td>Fuel staging</td></tr>
<tr><td>c.</td><td>Flue-gas recirculation</td><td rowspan="2">Applicable within the constraints of water availability</td></tr>
<tr><td>d.</td><td>Low-NO_X burners (LNB)</td></tr>
<tr><td>e.</td><td>Water/steam addition</td><td>Not applicable to combustion plants operated < 500 h/yr with highly variable boiler loads.
The applicability may be limited in the case of combustion plants operated between 500 h/yr and 1 500 h/yr with highly variable boiler loads</td></tr>
<tr><td>f.</td><td>Selective non-catalytic reduction (SNCR)</td></tr>
<tr><td>g.</td><td>Selective catalytic reduction (SCR)</td><td rowspan="3">See descriptions in Section 8.3</td><td>Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr.
Not generally applicable to combustion plants of < 100 MW_{th}</td></tr>
<tr><td>h.</td><td>Advanced control system</td><td>Generally applicable to new combustion plants. The applicability to old combustion plants may be constrained by the need to retrofit the combustion system and/or control command system</td></tr>
<tr><td>i.</td><td>Fuel choice</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for NO_X emissions to air from the combustion of HFO and/or gas oil in boilers
<table>
<tr><th></th><th>BAT-AELs (mg/Nm^3)</th></tr>
</table>
</td><td>NA</td><td>The Operator employs the techniques below:
The site uses Low-NOx burners in its supplementary firing of the heat recovery steam generator.
The site uses an advanced distributed control system to operate its combustion process in the heat recovery steam generator.
The site uses Gas oil class A2 with a low Nitrogen component, typically between 0.01-0.05 % (m/m)

The ELVs do not apply as the units do not operate > 1,500 hours/year with these fuels.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (102)</th><th>New plant</th><th>Existing plant (103)</th></tr>
<tr><td>< 100</td><td>75–200</td><td>150–270</td><td>100–215</td><td>210–330 (104)</td></tr>
<tr><td>≥ 100</td><td>45–75</td><td>45–100 (105)</td><td>85–100</td><td>85–110 (106) (107)</td></tr>
</table>
As an indication, the yearly average CO emission levels will generally be:
— 10-30 mg/Nm^3 for existing combustion plants of < 100 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of <100 MW_{th},
— 10–20mg/Nm^3 for existing combustion plants of ≥ 100 MW_{th} operated ≥ 1 500 h/yr, or new combustion plants of ≥ 100 MW_{th}.
</td><td></td><td></td></tr>
<tr><td>29</td><td>
In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Duct sorbent injection (DSI)</td><td rowspan="6">See description in Section 8.4</td><td rowspan="3">Generally applicable</td></tr>
<tr><td>b.</td><td>Spray dry absorber (SDA)</td></tr>
<tr><td>c.</td><td>Flue-gas condenser</td></tr>
<tr><td>d.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW_{th}.
Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
<tr><td>e.</td><td>Seawater FGD</td><td>There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW_{th}.
Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
<tr><td>f.</td><td>Fuel choice</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of HFO and/or gas oil in boilers
</td><td>CC</td><td>The operator employs the techniques below:
The site uses Gas oil class A2 with a low Sulphur and Halogen components, typically between
The site uses Gas oil class A2 with a low Sulphur and Halogen components, typically between <0.0015 % (m/m) for Sulphur.
Due to this the site does not analysis for these components in its flue-gas.
The use of gas oil at Wissington is as a backup fuel and it can only be used if conditions are met and for a limited time period.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for SO_2 (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (108)</th><th>New plant</th><th>Existing plant (109)</th></tr>
<tr><td>< 300</td><td>50–175</td><td>50–175</td><td>150–200</td><td>150–200 (110)</td></tr>
<tr><td>≥ 300</td><td>35–50</td><td>50–110</td><td>50–120</td><td>150–165 (111) (112)</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td>30</td><td>In order to reduce dust and particulate-bound metal emissions to air from the combustion of HFO and/or gas oil in boilers, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Electrostatic precipitator (ESP)</td><td rowspan="2">See description in Section 8.5</td><td rowspan="5">Generally applicable</td></tr>
<tr><td>b.</td><td>Bag filter</td></tr>
<tr><td>c.</td><td>Multicyclones</td><td>See description in Section 8.5.
Multicyclones can be used in combination with other dedusting techniques</td></tr>
<tr><td>d.</td><td>Dry or semi-dry FGD system</td><td>See descriptions in Section 8.5.
The technique is mainly used for SO_X, HCl and/or HF control</td></tr>
<tr><td>e.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>See description in Section 8.5.
The technique is mainly used for SO_X, HCl and/or HF control</td><td>See applicability in BAT 29</td></tr>
<tr><td>f.</td><td>Fuel choice</td><td>See description in Section 8.5</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
</table>
</td><td>CC</td><td>Wissington employs the techniques below: f) The site uses Gas oil class A2 with a low ash content, typically between <0.01 % (m/m).
Due to this the site does not undertake analysis for the components in its flue-gas. The use of HFO at Wissington is as a backup fuel.</td></tr>
<tr><td>31</td><td>In order to increase the energy efficiency of HFO and/or gas oil combustion in reciprocating engines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
</table>
</td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP
Type of combustion unit:</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>a.</td><td>Combined cycle</td><td>See description in Section 8.2</td><td>Generally applicable to new units operated ≥ 1 500 h/yr.
Applicable to existing units within the constraints associated with the steam cycle design and the space availability.
Not applicable to existing units operated < 1 500 h/yr</td></tr>
</table>
BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of HFO and/or gas oil in reciprocating engines
<table>
<tr><th rowspan="3">Type of combustion unit</th><th colspan="2">BAT-AEELs (119)</th></tr>
<tr><th colspan="2">Net electrical efficiency (%) (120)</th></tr>
<tr><th>New unit</th><th>Existing unit</th></tr>
<tr><td>HFO- and/or gas-oil-fired reciprocating engine — single cycle</td><td>41,5–44,5 (121)</td><td>38,3–44,5 (121)</td></tr>
<tr><td>HFO- and/or gas-oil-fired reciprocating engine — combined cycle</td><td>> 48 (122)</td><td>No BAT-AEEL</td></tr>
</table>
</td><td>NO AEEL</td><td>CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>32</td><td>In order to prevent or reduce NO_X emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Low-NO_X combustion concept in diesel engines</td><td rowspan="4">See descriptions in Section 8.3</td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Exhaust-gas recirculation (EGR)</td><td>Not applicable to four-stroke engines</td></tr>
<tr><td>c.</td><td>Water/steam addition</td><td>Applicable within the constraints of water availability.
The applicability may be limited where no retrofit package is available</td></tr>
<tr><td>d.</td><td>Selective catalytic reduction (SCR)</td><td>Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr.
Retrofitting existing combustion plants may be constrained by the availability of sufficient space</td></tr>
</table></td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP Type of combustion unit:
CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>33</td><td>In order to prevent or reduce emissions of CO and volatile organic compounds to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or both of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combustion optimisation</td><td></td><td>Generally applicable</td></tr>
<tr><td>b.</td><td>Oxidation catalysts</td><td>See descriptions in Section 8.3</td><td>Not applicable to combustion plants operated < 500 h/yr.
The applicability may be limited by the sulphur content of the fuel</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for NO_X emissions to air from the combustion of HFO and/or gas oil in reciprocating engines
<table>
<tr><th></th><th>BAT-AELs (mg/Nm^3)</th></tr>
</table></td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP Type of combustion unit:
CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (123)</th><th>New plant</th><th>Existing plant (124) (125)</th></tr>
<tr><td>≥ 50</td><td>115–190 (126)</td><td>125–625</td><td>145–300</td><td>150–750</td></tr>
</table>
As an indication, for existing combustion plants burning only HFO and operated ≥ 1 500 h/yr or new combustion plants burning only HFO,
— the yearly average CO emission levels will generally be 50–175 mg/Nm^3,
— the average over the sampling period for TVOC emission levels will generally be 10–40 mg/Nm^3.</td><td></td><td></td></tr>
<tr><td>34</td><td>In order to prevent or reduce SO_X, HCl and HF emissions to air from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Fuel choice</td><td rowspan="3">See descriptions in Section 8.4</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
<tr><td>b.</td><td>Duct sorbent injection (DSI)</td><td>There may be technical restrictions in the case of existing combustion plants
Not applicable to combustion plants operated < 500 h/yr</td></tr>
<tr><td>c.</td><td>Wet flue-gas desulphurisation (wet FGD)</td><td>There may be technical and economic restrictions for applying the technique to combustion plants of < 300 MW_{th}.
Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr</td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for SO_2 emissions to air from the combustion of HFO and/or gas oil in reciprocating engines
<table>
<tr><th rowspan="2">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for SO_2 (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (127)</th><th>New plant</th><th>Existing plant (128)</th></tr>
<tr><td>All sizes</td><td>45–100</td><td>100–200 (129)</td><td>60–110</td><td>105–235 (129)</td></tr>
</table></td><td>NA</td><td>The operator operates a combined cycle gas turbine CHP
Type of combustion unit:
CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>35</td><td>In order to prevent or reduce dust and particulate-bound metal emissions from the combustion of HFO and/or gas oil in reciprocating engines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th>Technique</th><th>Description</th><th>Applicability</th></tr>
</table></td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP
Type of combustion unit:</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td>
<table>
<tr><td>a.</td><td>Fuel choice</td><td rowspan="3">See descriptions in Section 8.5</td><td>Applicable within the constraints associated with the availability of different types of fuel, which may be impacted by the energy policy of the Member State</td></tr>
<tr><td>b.</td><td>Electrostatic precipitator (ESP)</td><td>Not applicable to combustion plants operated < 500 h/yr</td></tr>
<tr><td>c.</td><td>Bag filter</td><td></td></tr>
</table>
BAT-associated emission levels (BAT-AELs) for dust emissions to air from the combustion of HFO and/or gas oil in reciprocating engines
<table>
<tr><th rowspan="3">Combustion plant total rated thermal input (MW_{th})</th><th colspan="4">BAT-AELs for dust (mg/Nm^3)</th></tr>
<tr><th colspan="2">Yearly average</th><th colspan="2">Daily average or average over the sampling period</th></tr>
<tr><th>New plant</th><th>Existing plant (130)</th><th>New plant</th><th>Existing plant (131)</th></tr>
<tr><td>≥ 50</td><td>5–10</td><td>5–35</td><td>10–20</td><td>10–45</td></tr>
</table>
</td><td></td><td>CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>36</td><td>
In order to increase the energy efficiency of gas oil combustion in gas turbines, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Combined cycle</td><td>See description in Section 8.2</td><td>Generally applicable to new units operated ≥ 1 500 h/yr.
Applicable to existing units within the constraints associated with the steam cycle design and the space availability.
Not applicable to existing units operated < 1 500 h/yr</td></tr>
</table>
BAT-associated energy efficiency levels (BAT-AEELs) for gas-oil-fired gas turbines
<table>
<tr><th rowspan="3">Type of combustion unit</th><th colspan="2">BAT-AEELs (132)</th></tr>
<tr><th colspan="2">Net electrical efficiency (%) (133)</th></tr>
<tr><th>New unit</th><th>Existing unit</th></tr>
<tr><td>Gas-oil-fired open-cycle gas turbine</td><td>> 33</td><td>25–35,7</td></tr>
<tr><td>Gas-oil-fired combined cycle gas turbine</td><td>> 40</td><td>33–44</td></tr>
</table>
</td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP
Type of combustion unit:
CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>37</td><td>
In order to prevent or reduce NO_X emissions to air from the combustion of gas oil in gas turbines, BAT is to use one or a combination of the techniques given below.
<table>
<tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr>
<tr><td>a.</td><td>Water/steam addition</td><td rowspan="3">See description in Section 8.3</td><td>The applicability may be limited due to water availability</td></tr>
<tr><td>b.</td><td>Low-NO_X burners (LNB)</td><td>Only applicable to turbine models for which low-NO_X burners are available on the market</td></tr>
<tr><td>c.</td><td>Selective catalytic reduction (SCR)</td><td>Not applicable to combustion plants operated < 500 h/yr.
There may be technical and economic restrictions for retrofitting existing combustion plants operated between 500 h/yr and 1 500 h/yr.</td></tr>
</table>
</td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP
Type of combustion unit:
CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
</table>

<table>
<tr><th>BAT C. No.</th><th>Summary of BAT Conclusion requirements for Large Combustion Plant</th><th>Status NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td></td><td><table><tr><td></td><td></td><td></td><td>Retrofitting existing combustion plants may be constrained by the availability of sufficient space</td></tr></table></td><td></td><td></td></tr>
<tr><td>38</td><td>In order to prevent or reduce CO emissions to air from the combustion of gas oil in gas turbines, BAT is to use one or a combination of the techniques given below.<table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Combustion optimisation</td><td rowspan="2">See description in Section 8.3</td><td>Generally applicable</td></tr><tr><td>b.</td><td>Oxidation catalysts</td><td>Not applicable to combustion plants operated < 500 h/yr.
Retrofitting existing combustion plants may be constrained by the availability of sufficient space</td></tr></table>As an indication, the emission level for NO_X emissions to air from the combustion of gas oil in dual fuel gas turbines for emergency use operated < 500 h/yr will generally be 145–250 mg/Nm^3 as a daily average or average over the sampling period.</td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP Type of combustion unit: CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td>39</td><td>In order to prevent or reduce SO_X and dust emissions to air from the combustion of gas oil in gas turbines, BAT is to use the technique given.</td><td>N/A</td><td>The operator operates a combined cycle gas turbine CHP Type of combustion unit: CHP CCGT 50-600 MWth. The units do not operate > 1,500 hours/year with these fuels.</td></tr>
<tr><td colspan="4">Combustion of gaseous fuels</td></tr>
<tr><td>40</td><td>In order to increase the energy efficiency of natural gas combustion, BAT is to use an appropriate combination of the techniques given in BAT 12 and below.<table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Combined cycle</td><td>See description in Section 8.2</td><td>Generally applicable to new gas turbines and engines except when operated < 1 500 h/yr.
Applicable to existing gas turbines and engines within the constraints associated with the steam cycle design and the space availability.
Not applicable to existing gas turbines and engines operated < 1 500 h/yr.
Not applicable to mechanical drive gas turbines operated in discontinuous mode with extended load variations and frequent start-ups and shutdowns.
Not applicable to boilers</td></tr></table>BAT-associated energy efficiency levels (BAT-AEELs) for the combustion of natural gas<table><tr><th rowspan="2">Type of combustion unit</th><th colspan="3">BAT-AEELs [136] [137]</th></tr><tr><th>Net electrical efficiency (%)</th><th>Net total fuel utilisation (%) [138] [139]</th><th>Net mechanical energy efficiency (%) [139] [140]</th></tr></table></td><td>CC</td><td>The operator operates a combined cycle gas turbine CHP Type of combustion unit: CHP CCGT 50-600 MWth. The net total fuel utilisation data is presented in the table below:<table><tr><th>Year</th><th>Net total fuel utilisation (%) *</th></tr><tr><td>2020</td><td>83.5</td></tr><tr><td>2019</td><td>81.3</td></tr><tr><td>2018</td><td>82.5</td></tr></table>*based on submitted CHPQA returns</td></tr>
</table>

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
	<table><tr><th></th><th>New unit</th><th>Existing unit</th><th></th><th>New unit</th><th>Existing unit</th></tr><tr><td>Gas engine</td><td>39,5–44 (141)</td><td>35–44 (141)</td><td>56–85 (141)</td><td colspan="2">No BAT-AEEL.</td></tr><tr><td>Gas-fired boiler</td><td>39–42,5</td><td>38–40</td><td>78–95</td><td colspan="2">No BAT-AEEL.</td></tr><tr><td>Open cycle gas turbine, ≥ 50 MWth</td><td>36–41,5</td><td>33–41,5</td><td>No BAT-AEEL</td><td>36,5–41</td><td>33,5–41</td></tr><tr><td colspan="6">Combined cycle gas turbine (CCGT)</td></tr><tr><td>CCGT, 50–600 MW_{th}</td><td>53–58,5</td><td>46–54</td><td>No BAT-AEEL</td><td colspan="2">No BAT-AEEL</td></tr><tr><td>CCGT, ≥ 600 MW_{th}</td><td>57–60,5</td><td>50–60</td><td>No BAT-AEEL</td><td colspan="2">No BAT-AEEL</td></tr><tr><td>CHP CCGT, 50–600 MW_{th}</td><td>53–58,5</td><td>46–54</td><td>65–95</td><td colspan="2">No BAT-AEEL</td></tr><tr><td>CHP CCGT, ≥ 600 MW_{th}</td><td>57–60,5</td><td>50–60</td><td>65–95</td><td colspan="2">No BAT-AEEL</td></tr></table>		
41	In order to prevent or reduce NO_X emissions to air from the combustion of natural gas in boilers, BAT is to use one or a combination of the techniques given	CC	The Operator employs the techniques below: Low-NOx burners in its supplementary firing of the heat recovery steam generator. An advanced distributed control system to operate its combustion process in the heat recovery steam generator.
42	In order to prevent or reduce NO_X emissions to air from the combustion of natural gas in gas turbines, BAT is to use one or a combination of the techniques given.	CC	The Operator employs the techniques below: gas turbine utilises a combustion control computer to optimise the combustion process. gas turbine uses dry low-NOx burners. low-NOx burners for supplementary firing in the HRSG. The Operator states that the Dry low NOx burners are effective from first firing to full load. However, we have added IP11 to established a full profile.

BAT C. No.	Summary of BAT Conclusion requirements for Large Combustion Plant	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
43	In order to prevent or reduce NO_X emissions to air from the combustion of natural gas in engines, BAT is to use one or a combination of the techniques given.	NA	N/A due to age and location
44	In order to prevent or reduce CO emissions to air from the combustion of natural gas, BAT is to ensure optimised combustion and/or to use oxidation catalysts.	CC	Wissington control CO levels by optimising the combustion process, document BS-CHP-WI-001: Emissions Control on HRSG details the steps operators should take is CO levels are high
45	In order to reduce non-methane volatile organic compounds (NMVOC) and methane (CH_4) emissions to air from the combustion of natural gas in spark-ignited lean-burn gas engines, BAT is to ensure optimised combustion and/or to use oxidation catalysts.	NA	N/A

BAT Conclusion No	**Summary of BAT Conclusion requirement for** production of Cement, Lime and Magnesium Oxide	**Status NA/ C / FC / NC**	**Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement**
3-29 55-69	BAT Conclusions that are not applicable to this installation	NA	BAT Conclusions 3 – 29 inclusive are not applicable as they apply to cement industry only. BAT Conclusions 55 – 69 inclusive are not applicable as they apply to the magnesium oxide industry only.
1	In order to improve the overall environmental performance of the plants/installations producing cement, lime and magnesium oxide, production BAT is to implement and adhere to an environmental management system (EMS) that incorporates all of the listed features.	CC	As per FDM BAT 1.
2	In order to reduce/minimise noise emissions during the manufacturing processes for cement, lime and magnesium oxide, BAT is to use a combination of the listed techniques.	CC	As per FDM BAT 13 and 14.
30	In order to reduce all kiln emissions and use energy efficiently, BAT is to achieve a smooth and stable kiln process, operating close to the process parameter set points by using the listed techniques.	CC	The operator employs the following techniques: a) Process control optimisation, including computer-based automatic control. The lime kiln is run using the sites DCS system, process parameters such as temperatures and air flows are fed back to a centralised control room. b) Both the limestone and fuel feeds to the lime kiln is done via gravimetric measurement. Limestone to fuel ratios are adjusted to optimise energy efficiency i.e., to ensure no overburnt limestone, and to maximise burnt lime and kiln gas quality.
31	In order to prevent and/or reduce emissions, BAT is to carry out a careful selection and control of the raw materials entering the kiln.	CC	The operator employs the following techniques to reduce emissions: Raw materials, limestone and solid fuel are procured to a British Sugar specification to minimise to ensure that limestone and fuel impurity levels are minimised and both fuel and limestone breakage is minimised. The specifications define key parameters including the required physical properties.

<table>
<tr><th>BAT Conclusion No</th><th>Summary of BAT Conclusion requirement for production of Cement, Lime and Magnesium Oxide</th><th>Status NA/ C / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>32</td><td>BAT is to carry out monitoring and measurements of process parameters and emissions on a regular basis and to monitor emissions in accordance with the relevant EN standards or, if EN standards are not available, ISO, national or other international standards that ensure the provision of data of an equivalent scientific quality.
<table>
<tr><th></th><th>Technique</th><th>Applicability</th></tr>
<tr><td>a</td><td>Continuous measurements of process parameters demonstrating the process stability, such as temperature, O_2 content, pressure, flow rate and CO emissions</td><td rowspan="2">Applicable to kiln processes</td></tr>
<tr><td>b</td><td>Monitoring and stabilising of critical process parameters, e.g. fuel feed, regular dosage and excess oxygen</td></tr>
<tr><td>c</td><td>Continuous or periodic measurements of dust, NO_x, SO_x, CO emissions and NH_3 emissions when SNCR is applied</td><td>Applicable to kiln processes</td></tr>
<tr><td>d</td><td>Continuous or periodic measurements of HCl and HF emissions in case wastes are co-incinerated</td><td>Applicable to kiln processes</td></tr>
<tr><td>e</td><td>Continuous or periodic measurements of TOC emissions or continuous measurements in case wastes are co-incinerated</td><td>Applicable to kiln processes</td></tr>
<tr><td>f</td><td>Periodic measurements of PCDD/F and metal emissions</td><td>Applicable to kiln processes</td></tr>
<tr><td>g</td><td>Continuous or periodic measurements of dust emissions</td><td>Applicable to non-kiln processes

For small sources (<10 000 Nm^3/h) the frequency of the measurements should be based on a maintenance management system</td></tr>
</table></td><td>CC</td><td>The operator employs the following techniques:
a) The sites kiln has continuous measurement on process parameters including, temperature, pressure, and air flows. These are fed back to the sites distributed control system (DCS)
b) Fuel and limestone feed to the kiln is monitored and controlled by the sites DCS
c) SNCR is not employed on the lime kiln.
d) Waste fuels are not co-incinerated. The fuel is of a single type either coke or anthracite, both purchased to a specific specification.
e) Waste fuels are not co-incinerated. The fuel is of a single type either coke or anthracite, both purchased to a specific specification</td></tr>
<tr><td>33</td><td>In order to reduce/minimise thermal energy consumption, BAT is to use a combination of the listed techniques.</td><td>CC</td><td>The operator employs a combination of the following techniques:
a) The sites limekiln has continuous measurements on process parameters to ensure that kiln control is run to optimal values. II. Not applicable to mixed feed shaft Kilns (MFSK) III. Limestone and fuel feed to the kiln is by a gravimetric system IV. The kiln in regularly maintained, the site operates a Planned Preventative Maintenance (PPM) program that ensures the integrity of the limekiln is maintained and air ingress is minimised. I Inspections and testing are undertaken at regular intervals by specially trained engineers to prevent the potential for breakdown, confirm safety and ensure it is efficient in operation. V. Stone size is specified in the defined British Sugar specification
b) The fuel used in the kiln is chosen to a defined British Sugar specification which includes calorific value and moisture content.
c) Not applicable to MFSK
Wissington’s specific energy consumption falls within the 3.4-4.7 GJ/tonne of product range</td></tr>
</table>

BAT Conclusion No	**Summary of BAT Conclusion requirement for** production of Cement, Lime and Magnesium Oxide	**Status NA/ C / FC / NC**	**Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement**
34	In order to minimise electrical energy consumption, BAT is to use one or a combination of the listed techniques.		Electrical consumption is restricted to raw materials and burnt lime conveying and gas pumps and the lime slaker drive. There is no grinding of limestone within the process. Energy efficient equipment is employed where possible
35	In order to minimise limestone consumption, BAT is to use one or a combination of the listed techniques	**CC**	The operator employs the following techniques: a) Limestone sizing is defined in in specification PCS-014. The sizing is specified to allow efficient burning of stone and good air flows through the limekiln to produce high quality burnt lime which will slake effectively to produce a milk of lime which has a high surface area of lime particles which maximises purification of the sugar juice. This will ensure that the minimum amount of lime is used for sugar juice purification. A high-quality limestone is specified to ensure a high quality burnt lime is produced. b) Unburnt limestone is recovered from the lime slaker and is recycled back to the kiln to minimise process losses and raw materials usage.
36	In order to prevent/reduce emissions, BAT is to carry out a careful selection and control of fuels entering the kiln	**CC**	Wissington operates a mixed feed shaft kiln, the solid fuels that are used in the kiln are procured to meet BS specification (PCS-014). The kiln gas is initially scrubbed to remove particulate matter before passing through the gas pumps to the sugar process where it is introduced into a sugar juice, milk of lime mixture in a two stage carbonatation process. This is effectively ensuring all kiln gas is scrubbed twice, firstly by water in the gas washer and then through a lime solution in the sugar process. SO2 is absorbed by the re-precipitated calcium carbonate in the process. In addition, the lime will scrub other acid gases.
37	In order to guarantee the characteristics of waste to be used as fuel in a lime kiln, BAT is to apply the listed techniques:	**NA**	Not applicable – waste fuels are not used.
38	In order to prevent/reduce emissions occurring from the use of waste fuels into the kiln, BAT is to use the listed techniques	**NA**	Not applicable – waste fuels are not used.
39	In order to prevent accidental emissions, BAT is to use safety management for the storage, handling and feeding into the kiln of hazardous waste materials	**NA**	Not applicable – hazardous wastes are not used in the kiln.

BAT Conclusion No	**Summary of BAT Conclusion requirement for** production of Cement, Lime and Magnesium Oxide	**Status NA/ C / FC / NC**	**Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement**
40	In order to minimise/prevent diffuse dust emissions from dusty operations, BAT is to use one or a combination of the listed techniques	**CC**	The operator employs a combination of the following techniques: a) Limestone and burnt lime conveyors are enclosed to minimise dust emissions. Limestone and fuel hoppers have high level indication to reduce the risk of overloading and spillage, these are fed back to the DCS g) British sugar operates a planned preventative maintenance system to ensure the proper and complete maintenance of its equipment, plant item areas checked by regular audio-visual inspection routes. h) The whole kiln, slaking and carbonatation process is monitored and controlled by the site DCS
41	In order to minimise/prevent diffuse dust emissions from bulk storage areas, BAT is to use one or a combination of the listed techniques	**CC**	The operator uses a combination of the following techniques: a) Limestone and anthracite stocks are stored in locations with artificial screening for wind protection. c) Floors are damped down to reduce diffuse dust emissions when required. g) Surfaces are damped down to reduce diffuse dust emissions. Outside areas are regularly cleaned by road sweepers to reduce material build up which may lead to diffuse dust emissions by site transport and in extremely dry conditions from wind blow.
42	In order to reduce channelled dust emissions from dusty operations other than those from kiln firing processes, BAT is to use one of the listed techniques and to use a maintenance management system which specifically addresses the performance of filters	**CC**	Milk of lime for sugar processing is produced by mixing the burnt lime from the kiln with a dilute sugar solution within the lime slaker, exhaust air from the slaker passes through a hydro cyclone to reduce particulate emissions. Annual planned preventative maintenance is scheduled and carried out and shiftily Audio-Visual Inspections are carried out to ensure the plant is running to design specification. The BAT-AEL has been applied to the slaker vent.
43	In order to reduce dust emissions from the flue-gases of kiln firing processes, BAT is to use flue-gas cleaning with a filter. One or a combination of the listed techniques can be used	**CC**	The operator uses the following techniques: c) The gas from the limekiln is pulled from the top of the limekiln through gas washers by a gas pump and is introduced into the sugar juice purification process (carbonatation). The gas washer removes any entrained particulate matter preventing damage to the gas pump. The gas washers are supplied with recycled water from the sugar process (condenser water). The sugar process carbonatation system essentially acts as a second stage wet scrubber. The BAT-AEL may not apply subject to IP12.

BAT Conclusion No	**Summary of BAT Conclusion requirement for** production of Cement, Lime and Magnesium Oxide	**Status NA/ C / FC / NC**	**Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement**
44	In order to reduce the emissions of gaseous compounds (i.e. NOx, SOx , HCl, CO, TOC/VOC, volatile metals) from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The operator employs the following techniques: a) Raw materials are purchased to a specification which minimises the amount of impurities in the limestone and fuel. b) Both coke and anthracite are used in the kiln as a fuel and these are sourced to British Sugar specifications which include a specification to minimise the sulphur content. British Sugar specifies only very high purity limestone to be used in the lime kiln this is to maximise the quality of the burnt lime used for carbonatation. This ensures maximum juice purification. c) Process control optimisation, including computer-based automatic control. The lime kiln is run using the sites DCS system, process parameters such as temperatures and air flows are fed back to a centralised control room. The carbonatation vessels are fitted with gas distributors which maximise the reprecipitation of calcium carbonate by ensuring maximum contact between the limed sugar juice and the carbon dioxide and subsequent removal by the lime of acid gases and impurities. The BAT-AELs may not apply, subject to IP12.
45	In order to reduce the emissions of NOx from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The operator uses a combination of the following techniques: a) Primary techniques I. Wissington operates a Mixed feed shaft kiln and only anthracite, coke and limestone are used in the kiln. All gas from the limekiln passes through a gas washer (water scrubber) and through the sugar carbonatation process which acts as a lime scrubber. The BAT-AEL may not apply, subject to IP12.
46	When SNCR is used, BAT is to achieve efficient NOx reduction, while keeping the ammonia slip as low as possible, by using the listed technique	**NA**	SNCR is not used at the site and thus the BATC is not applicable.
47	In order to reduce the emissions of SOx from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The operator uses a combination of the following techniques: a) Process control optimisation, including computer-based automatic control. The lime kiln is run using the sites DCS system, process parameters such as temperatures and air flows are fed back to a centralised control room. b) Both coke and anthracite used as fuel for the limekiln have maximum sulphur specifications. Gas from the kiln is passed through a gas washer and is then introduced into the sugar factory purification process. This acts as a lime scrubber and will remove sulphur dioxide readily.

BAT Conclusion No	**Summary of BAT Conclusion requirement for** production of Cement, Lime and Magnesium Oxide	**Status NA/ C / FC / NC**	**Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement**
48	In order to reduce the emissions of CO from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The operator uses a combination of the following techniques: a) Fuel and limestone used in the kiln is bought to a British Sugar specification the organic content of the limestone is low. Process control optimisation, including computer-based automatic control. The lime kiln is run using the sites DCS system, process parameters such as temperatures and air flows are fed back to a centralised control room. The fuel to stone ratio is adjusted to ensure that the limestone is burnt efficiently to minimise over burning or under burning. This optimisation of combustion within the kiln will control carbon monoxide emissions
49	In order to minimise the frequency of CO trips when using electrostatic precipitators, BAT is to use the listed techniques	**NA**	Not applicable as ESP's are not utilised.
50	In order to reduce the emissions of TOC from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The operator employs the following techniques to reduce emissions: Raw materials, limestone and solid fuel are procured to a British Sugar specification to minimise to ensure that limestone and fuel impurity levels are minimised and both fuel and limestone breakage is minimised. The specifications define key parameters including the required physical properties.
51	In order to reduce the emissions of HCl and the emissions of HF from the flue-gas of kiln firing processes, when using waste, BAT is to use the following primary techniques	**NA**	Not applicable as the site does not use waste as fuels.
52	In order to prevent or reduce the emissions of PCDD/F from the flue-gas of kiln firing processes, BAT is to use one or a combination of the listed primary techniques	**NA**	British Sugar does not use waste or waste derived fuels within its limekilns. The limestone specification requires a minimum 98 % purity. All kiln gas is passed through a gas washer which quickly reduces the temperature to around 40C. The gas is then passed through the sugar factory carbonatation system which acts as a lime scrubber.
53	In order to minimise the emissions of metals from the flue-gases of kiln firing processes, BAT is to use one or a combination of the listed techniques	**CC**	The kiln gas is passed through a gas washer and then through the sugar factory carbonatation system which effectively acts as a lime scrubber. All particulates will therefore be removed in this two stage wet scrubbing process.
54	In order to reduce the solid wastes from the lime manufacturing processes and to save raw materials, BAT is to use the listed techniques	**CC**	The operator uses a combination of the following techniques: a) Limestone screenings are either sold or used in place of virgin aggregate to maintain site roadways. Unburnt limestone is recycled back into limestone feed to kiln where material is suitable. Inert material (dross) generated from limited impurities within the limestone raw material are used for internal site roads maintenance

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Waste Treatment – Applicable for Food and Drink sites with Anaerobic Digestion.</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>15</td><td>BAT is to use flaring only for safety reasons or for non-routine operating conditions (e.g. start-ups, shutdowns) by using both of the techniques given below.
<table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Correct plant design</td><td>This includes the provision of a gas recovery system with sufficient capacity and the use of high-integrity relief valves.</td><td>Generally applicable to new plants.
A gas recovery system may be retrofitted in existing plants.</td></tr><tr><td>b.</td><td>Plant management</td><td>This includes balancing the gas system and using advanced process control.</td><td>Generally applicable.</td></tr></table></td><td>CC</td><td>The site minimises the use of flaring, biogas is compressed and sent to the sites CHP plant. The system is integrated in to the sites distributed control system.</td></tr>
<tr><td>16</td><td>In order to reduce emissions to air from flares when flaring is unavoidable, BAT is to use both of the techniques given below.
<table><tr><th colspan="2">Technique</th><th>Description</th><th>Applicability</th></tr><tr><td>a.</td><td>Correct design of flaring devices</td><td>Optimisation of height and pressure, assistance by steam, air or gas, type of flare tips, etc., to enable smokeless and reliable operation and to ensure the efficient combustion of excess gases.</td><td>Generally applicable to new flares. In existing plants, applicability may be restricted, e.g. due to maintenance time availability.</td></tr><tr><td>b.</td><td>Monitoring and recording as part of flare management</td><td>This includes continuous monitoring of the quantity of gas sent to flaring. It may include estimations of other parameters (e.g. composition of gas flow, heat content, ratio of assistance, velocity, purge gas flow rate, pollutant emissions (e.g. NO_X, CO, hydrocarbons), noise). The recording of flaring events usually includes the duration and number of events and allows for the quantification of emissions and the potential prevention of future flaring events.</td><td>Generally applicable.</td></tr></table></td><td>CC</td><td>Gas quality and flow is monitored continuously when flaring and fed back to the sites distributed control system.</td></tr>
</table>

<table>
<tr><th>BATC No.</th><th>Summary of BAT Conclusion requirement for Waste Treatment – Applicable for Food and Drink sites with Anaerobic Digestion.</th><th>Status
NA/ CC / FC / NC</th><th>Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement</th></tr>
<tr><td>21</td><td>In order to prevent or limit the environmental consequences of accidents and incidents, BAT is to use all of the techniques given below, as part of the accident management plan (see BAT 1).

<table><tr><th colspan="2">Technique</th><th>Description</th></tr><tr><td>a.</td><td>Protection measures</td><td>These include measures such as:
— protection of the plant against malevolent acts;
— fire and explosion protection system, containing equipment for prevention, detection, and extinction;
— accessibility and operability of relevant control equipment in emergency situations.</td></tr><tr><td>b.</td><td>Management of incidental/accidental emissions</td><td>Procedures are established and technical provisions are in place to manage (in terms of possible containment) emissions from accidents and incidents such as emissions from spillages, firefighting water, or safety valves.</td></tr><tr><td>c.</td><td>Incident/accident registration and assessment system</td><td>This includes techniques such as:
— a log/diary to record all accidents, incidents, changes to procedures and the findings of inspections;
— procedures to identify, respond to and learn from such incidents and accidents.</td></tr></table></td><td>CC</td><td>Site security measures to prevent access to the site are defined within the Site Security Plan. The site has its own fire fighting capacity with a team of trained firefighters on site and the appropriate equipment. The distributed control system can be accessed and the plant can be fully shutdown remotely if needed.

All emissions from accidents and incidents would be managed through the sites ponds and waste water treatment plant.

Incident and accidents are logged in a computerised system, investigations and follow-up actions are tracked through to completion. Findings are shared with other</td></tr>
</table>

BATC No.	Summary of BAT Conclusion requirement for Waste Treatment – Applicable for Food and Drink sites with Anaerobic Digestion.	Status NA/ CC / FC / NC	Assessment of the installation capability and any alternative techniques proposed by the operator to demonstrate compliance with the BAT Conclusion requirement
38	In order to reduce emissions to air and to improve the overall environmental performance, BAT is to monitor and/or control the key waste and process parameters. Implementation of a manual and/or automatic monitoring system to: • ensure a stable digester operation; • minimise operational difficulties, such as foaming, which may lead to odour emissions; • provide sufficient early warning of system failures which may lead to a loss of containment and explosions. This includes monitoring and/or control of key waste and process parameters, e.g.: • pH and alkalinity of the digester feed; • digester operating temperature; • hydraulic and organic loading rates of the digester feed; • concentration of volatile fatty acids (VFA) and ammonia within the digester and digestate; • biogas quantity, composition (e.g. H2S) and pressure; • liquid and foam levels in the digester.	**CC**	Key process parameters are monitored, such as - 1) Feed quality: including the following: COD, BOD, VFA, NH3, pH, Temp, SS, hardness. 2)Reactor: SS, Temp, foaming levels. 3) Treated water quality: flow, COD, BOD, NH3, SS, pH, VFA, hardness. 4) Biogas: Flow, H2S, Methane. Daily loading rates are calculated and feed flows adjusted accordingly. All levels and flows feed back to the sites distributed control systems.

Annex 2: Review and assessment of changes that are not part of the BAT Conclusions derived permit review

Updating permit during permit review consolidation

- Introductory note
- Table S1.1 overhaul
    - Activity Reference (AR) renumbering
    - Updated listed activities
    - Addition of production capacity
    - Directly associated activities (DAAs) standardisation

We have updated permit conditions to those in the current generic permit template as a part of permit consolidation. The conditions will provide the same level of protection as those in the previous permit.

Production/Capacity Threshold

The Environment Agency is looking to draw a “line in the sand” for permitted production capacity; a common understanding between the Operator and regulator for the emissions associated with a (maximum) level of production, whereby the maximum emissions have been demonstrated as causing no significant environmental impact.

The operator has provided the production capacities of relevant activities as per Table S1.1 of the permit.

We are satisfied that the most recent risk assessment for these capacities remains valid.

Emissions to Air

We asked the operator to list all emission points to air from the installation in the Regulation 61 notice. And to provide a site plan indicating the locations of all air emission points.

The operator has provided an up to date air emission plan.

Implementing the requirements of the Medium Combustion Plant Directive

Existing Medium Combustion Plant (1MW-50MW)

We asked the Operator to provide information on all combustion plant on site in the Regulation 61 Notice as follows:

- Number of combustion plant (CHP engines, back-up generators, boilers);
- Size of combustion plant – rated thermal input (MWth)
- Date each combustion plant came into operation

The Operator provided the information in the table(s) below:

Boilers

1. Rated thermal input (MW) of the medium combustion plant.	Boiler 1 – 8MWth Boiler 2 – 10MWth
2. Type of the medium combustion plant (diesel engine, gas turbine, dual fuel engine, other engine or other medium combustion plant).	2 x boilers
3. Type and share of fuels used according to the fuel categories laid down in Annex II.	Both run on Natural gas with DFO as back-up fuel
4. Date of the start of the operation of the medium combustion plant or, where the exact date of the start of the operation is unknown, proof of the fact that the operation started before 20 December 2018.	Boiler 1 – Pre-2018 Boiler 2 – Pre-2018

We have reviewed the information provided and we consider that the declared combustion plant qualify as “existing” medium combustion plant.

For existing medium combustion plant with a rated thermal input greater than 5 MW, the emission limit values set out in tables 2 and 3 of Part 1 of Annex II MCPD shall apply from 1 January 2025.

Existing large combustion plant (>50MW)

The site operates Large Combustion Plant - LCP038

A full BAT assessment against the LCP BAT conclusions has been undertaken as detailed in Annex 1.

National Emissions Ceiling Directive Substances

The site gives rise to emissions of NECD substances, and we have undertaken an assessment of these to ensure that the appropriate permit controls are in place.

Emissions of NO_2

The operator has undertaken an assessment of the emissions of NO_2 from the LCP and the animal feed dryers.

The assessment shows that the short term emissions of NO_2 are significant from these sources.

However, this will be based on an assumption that there is 100% conversion to NO_2, whereas our assessment methodology states that for short term PCs and PECs, assume only 50% of emissions of oxides of nitrogen convert to nitrogen dioxide in the environment.

Emissions of SOx – No assessment undertaken

Based on the activities and routine fuels utilised, this is unlikely to be a significant parameter.

Emissions of Particulate matter

The operator has undertaken an assessment of the emissions of PM10 and PM2.5 from the lime slaker vents (PM10 only) and the animal feed dryers.

The assessment shows that the short term emissions of PM2.5 are significant from these sources.

BAT-AELs are derived for those substances identified as key environmental issues during the BREF review process.

The operator has identified current compliance against BAT-AELs and we have implemented the relevant emission limit value (ELV) from the effective date of the permit.

We have also included improvement conditions IP5 and IP6 for the operator to investigate further reductions in the emissions of particulate matter.

Emissions of ammonia

The operator has undertaken an assessment of the emissions of ammonia from the sugar process, cooling towers and the animal feed dryers.

The assessment shows that the short term emissions of ammonia are significant from these sources.

We have included IP7 for the operator to investigate further reductions in the emissions of ammonia.

Emissions of Non-methane Volatile Organic Compounds

The operator has undertaken an assessment of the emissions of NMVOCs (as Benzene) from the animal feed dryers. This was assessed against the revised LT EAL standard.

The assessment shows that the long term and short term emissions of NMVOCs are insignificant from these sources.

However, to further reduce emissions of CO, methane, formaldehyde etc, we have imposed improvement condition IP8.

Emissions to Water and implementing the requirements of the Water Framework Directive

We asked the Operator to provide information on all emissions to water at the installation in the Regulation 61 Notice as follows;

- Identify any effluents which discharge directly to surface or groundwater;
- Provide an assessment of volume and quality, including results of any monitoring data available;
- and for any discharges to water / soakaway whether a recent assessment of the feasibility of connection to sewer has been carried out.

The operator has provided a revised risk assessment using the Environment Agency's H1 software tool for the following emissions: Chloride, Iron and EDTA.

The assessment shows that, applying the conservative criteria in our guidance on environmental risk assessment, all emissions may be screened out as environmentally insignificant.

However, the presence of EDTA in the wate water stream requires further investigation and we have added IP10, also having regard for the requirements of BATc 8.

To further protect water quality, we have imposed a monitoring requirement for neonicotinoids when these have been applied to the crop.

Finally, we have standardised the water discharge parameters to align with the processing and non-processing periods, including reducing the headroom of the permitted flows. As a result, we have ensured that the operator demonstrates BAT and the requirements protect the WFD status of the receiving watercourse.

Soil & groundwater risk assessment (baseline report)

The IED requires that the operator of any IED installation using, producing or releasing "relevant hazardous substances" (RHS) shall, having regarded the possibility that they might cause pollution of soil and groundwater, submit a "baseline report" with its permit application. The baseline report is an important reference document in the assessment of contamination that might arise during the operational lifetime of the regulated facility and at cessation of activities. It must enable a quantified comparison to be made between the baseline and the state of the site at surrender.

At the definitive cessation of activities, the Operator has to satisfy us that the necessary measures have been taken so that the site ceases to pose a risk to soil or groundwater, taking into account both the baseline conditions and the site's current or approved future use. To do this, the Operator has to submit a surrender application to us, which we will not grant unless and until we are satisfied that these requirements have been met.

The Operator submitted a site condition report during the original application. The site condition report included a report on the baseline conditions as required by Article 22. We reviewed that report and considered that it adequately described the condition of the soil and groundwater at that time.

Hazardous Substances

Hazardous substances are those defined in Article 3 of Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures

The operator has confirmed there has been no change in the hazardous substances used, their capability of causing pollution and/or the pollution prevention measures at the installation since the original risk assessment was undertaken.

Consequently, we are satisfied there has been no change to the assessment of risk for hazardous substances.

Where such substances could be contained in the waste water from the installation, this has been considered in the Water Framework Directive section of this document.

Climate Change Adaptation

The operator has considered if the site is at risk of impacts from adverse weather (flooding, unavailability of land for land spreading, prolonged dry weather / drought).

The operator has identified the installation as likely to be or has been affected by flooding and prolonged dry weather/drought, which we consider to be a severe weather event.

The operator has management plans in place, which considers, as a minimum the impact of severe weather on the operations within the installation.

We consider the management plans to be appropriate for the installation.

Containment

We asked the Operator vis the Regulation 61 Notice to provide details of the each above ground tanks which contain potentially polluting liquids at the site, including tanks associated with the effluent treatment process where appliable.

The Operator provided details of all tanks;

- Tank reference/name
- Contents
- Capacity (litres)
- Location
- Construction material(s) of each tank
- The bunding specification including
    - Whether the tank is bunded
    - If the bund is shared with other tanks
    - The capacity of the bund
    - The bund capacity as % of tank capacity
    - Construction material of the bund
    - Whether the bund has a drain point

    - Whether any pipes penetrate the bund wall
- Details of overfill prevention
- Drainage arrangements outside of bunded areas
- Tank filling/emptying mitigation measures (drips/splashes)
- Leak detection measures
- Details of when last bund integrity test was carried out
- Maintenance measures in place for tank and bund (inspections)
- How the bund is emptied
- Details of tertiary containment

and whether the onsite tanks currently meet the relevant standard in the Ciria "Containment systems for the prevention of pollution (C736)" report or alternative appropriate measures.

We reviewed the information provided by the operator. Whilst we are broadly satisfied that the existing tanks and containment measures on site meet the standards set out in CIRIA C736 or alternative appropriate measures, we consider that further assessment of the ETP tanks is required.

We have set improvement conditions in the permit to address the potential deficiencies in the existing tanks and containment measures on site (IP14). See Improvement condition(s) in Annex 3 of this decision document.

Annex 3: Improvement Conditions

Based on the information in the Operator's Regulation 61 Notice response and our own records of the capability and performance of the installation at this site, we consider that we need to set improvement conditions so that the outcome of the techniques detailed in the BAT Conclusions are achieved by the installation. These improvement conditions are set out below - justifications for them is provided at the relevant section of the decision document (Annex 1 or Annex 2).

The following improvement conditions have added to the permit as a result of the variation.

Improvement programme requirements		
Reference	**Reason for inclusion**	**Justification of deadline**
IP5	In relation to FDM BAT 35 to look at the feasibility of steam drying to significantly reduce particulate emissions and improve energy efficiency	Reasonable timeframe for completion
IP6	Particulates are a key issue for the sector	To give the operator appropriate time to undertake monitoring
IP7	Ammonia is a key issue for the sector	
IP8	Emissions of CO, methane, formaldehyde etc are elevated in this sector as demonstrated by PI returns	
IP9	A routine requirement in line with animal feed production	Reasonable timeframe for completion
IP10	In line with FDM BAT 8	Reasonable timeframe for completion
IP11	In line with LCP BAT 44 to establish a meaningful low NOx profile for the site.	Reasonable timeframe for completion
IP12	The operator does not directly discharge lime kiln gases to atmosphere, as it is utilised into the sugar production process. As such, the nature of the emissions may be such that the CLM BAT-AELs do not apply	To give the operator appropriate time to undertake monitoring
IP13	To ensure the lagoons do not impact on surface water	Reasonable timeframe for completion
IP14	To ensure the ETP has appropriate secondary containment	Reasonable timeframe for completion