

Emission Monitoring

Introduction

The TEGCO Immingham Ltd Installation at Netherlands Way, Stallingborough, Grimsby, DN41 8DF is an Energy from Waste (EfW) process. The installation is designed to consume 320,000 Te/yr of Refuse Derived Fuel (RDF) based on 10 MJ/kg (LHV), producing: -

- 12 MW electrical export,
- 51 MW thermal export (60 Te/hr) as steam (no condensate return).

The installation is a Combined Heat & Power (CHP) plant sized and is designed to replace the steam and electricity currently generated by an existing CHP plant on an adjacent industrial plant. The existing CHP plant is reaching the end of its operational life and will be decommissioned when the installation is operational.

The need to continue to take waste in the event that steam and/or electricity cannot be exported (e.g. customer is shutdown), the installation is designed such that all steam generated at normal waste feed can pass through the turbine and condenser resulting in 24 MW electrical export.

A proportion of the RDF is sourced from local waste management companies and transported to the installation by road. The remaining is sourced from further afield and transported by rail to 1 of 2 local railheads and the final transfer from the railhead to the installation is by road.

The installation will operate continuously (24 hr/day & 7 day/week) for >8,000 hr/yr.

The installation consists of 2 off 20Te/hr incineration lines (combustor, boiler & feed-water system) and a single turbine and air cooled condenser.

The installation is designed not to generate any waste water from the process during normal operation.

The installation is designed to be fully compliant with the 2019 European BREF for Waste Incineration (JRC 118637) and the associated BAT Conclusions published in the Official Journal of the European Union on 3rd December 2019.

Emissions monitoring

The plant will be equipped with modern monitoring and data logging devices to enable checks to be made of process efficiency. The purpose of monitoring has three main objectives: -

- To provide the information necessary for efficient and safe plant operation;
- To warn the operator if any emissions deviate from predefined ranges; and
- To provide records of emissions and events for the purposes of demonstrating regulatory compliance.

Sampling and analysis of all pollutants including dioxins and furans will be carried out to CEN or equivalent standards (e.g. ISO, national, or international standards). This ensures the provision of data of an equivalent scientific quality.

Where required, the water vapour content, temperature, pressure and flow of the flue gases will be monitored so that the emission concentrations can be reported at the relevant reference conditions (IED, BREF or EA).

Emissions to air

Point source emissions to air from the installation are from: -

Activity	Location	Identifier
Incineration of RDF	Incineration Line 1 discharge 65 m stack	A1
Incineration of RDF	Incineration Line 2 discharge 65 m stack	A2
Fly ash handling & export	Fly Ash Silo vent	A3
FGCr handling & export	Incineration Line 1 FGCr Silo vent	A4
FGCr handling & export	Incineration Line 2 FGCr Silo vent	A5
Hydrated lime handling	Incineration Line 1 Lime Silo vent	A6
Hydrated lime handling	Incineration Line 2 Lime Silo vent	A7
Powdered activated carbon handling	Activated Carbon Silo vent	A8

Release Points A1 & A2

Continuous monitors are installed for the following species/parameters at these emissions points as below: -

Species/Parameter	Standards	Avg Periods	Values	ELVs		Type
				Source	CI	
Particulate matter	EN 15267 (Parts 1-3) EN 13284-2 EN 14181	24 hrs ½ hr	5 mg/m ³ 30 mg/m ³	BAT AEL IED	30%	Electro-dynamic
Oxides of nitrogen (NO & NO ₂ as NO ₂)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	120 mg/m ³ 400 mg/m ³	BAT AEL IED	20%	FTIR
Nitrous Oxide (N ₂ O)	EN 15267 (Parts 1-3) EN 14181	24 hrs? ½ hr? ⁽¹⁾	N/A	EA	20%	FTIR
Sulphur dioxide (SO ₂)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	30 mg/m ³ 200 mg/m ³	BAT AEL IED	20%	FTIR
VOCs as Total Organic Carbon (TOC)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	10 mg/m ³ 20 mg/m ³	BAT AEL IED	30%	FID
Hydrogen chloride (HCl)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	6 mg/m ³ 60 mg/m ³	BAT AEL IED	40%	FTIR
Carbon monoxide (CO)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	50 mg/m ³ 100 mg/m ³	BAT AEL IED	10%	FTIR
Carbon Dioxide (CO ₂)	EN 15267 (Parts 1-3) EN 14181	24 hrs? ½ hr? ⁽¹⁾	N/A	EA	10%	FTIR
Ammonia (NH ₃)	EN 15267 (Parts 1-3) EN 14181	24 hrs ½ hr	10 mg/m ³	BAT AEL	40%	FTIR
Pressure	EN 15267 (Parts 1-3) EN 14181	Cont.	N/A	IED	??	XX
O ₂	EN 15267 (Parts 1-3) EN 14181	Cont.	N/A	IED	10%	Zirconium probe
H ₂ O	EN 15267 (Parts 1-3) EN 14181	Cont.	N/A	IED	10%	FTIR
Flow	EN 16911 (Part 2) EN 14181	Cont.	N/A	EA	??	??
Notes 1. Assume EA will require 24 hr and ½ hr averages as for other continuously monitored species.						

To ensure compliance with the standards, all continuous monitors will have MCERTS certification (if available) and will be subject to calibration and surveillance tests as agreed with the Environment Agency. These calibration and surveillance tests will be undertaken MCERTS certified contractors.

The results from all continuous monitors will be automatically entered into an MCERTS certified data management and reporting system to ensure robust demonstration of compliance, accurate reporting and automated notification of non-compliance to operating staff.

An additional common “hot standby CEMS” is installed. In normal operation this alternately monitors both emission points allowing it to be calibrated against the primary CEMS. In the event of primary CEMS failure, the “hot standby CEMS” is switched replace the failed primary CEMS.

These emission points will be subject periodic sampling and analysis for the following species: -

Species/Parameter	Sampling Period ⁽¹⁾⁽²⁾	Standards	Frequency	ELVs	
				Value	Source
Hydrogen fluoride (HF)	Short	CEN TS 17340	6 monthly ⁽⁴⁾	1 mg/Nm ³	BAT AEL
Mercury (Hg) ⁽²⁾	Short	EN 13211	6 monthly ⁽⁴⁾	20 µg/Nm ³	BAT AEL
Metals: Cd & Tl	Short	EN 14385	6 monthly ⁽⁴⁾	0.02 mg/Nm ³	BAT AEL
Metals: As, Co, Cr, Cu, Mn, Ni, Pd, Sb & V	Short	EN 14385	6 monthly ⁽⁴⁾	0.3 mg/Nm ³	BAT AEL
PCDD/F (I-TEQ) ⁽²⁾⁽³⁾	Short	EN 1948 (Parts 1-3)	6 monthly ⁽⁴⁾	0.04 ng/Nm ³⁽⁵⁾	BAT AEL
PCBs ⁽²⁾	Short	EN 1948 (Parts 1, 2, 4)	6 monthly ⁽⁴⁾	N/A	BAT AEL
PBDD/F (I-TEQ) ⁽²⁾⁽³⁾	Short	EN 1948 (Parts 1-3)	6 monthly ⁽⁴⁾	N/A	EA
Benzo (α) Pyrene	Short	ISO 11338-(Parts 1-2)	6 monthly ⁽⁴⁾	N/A	EA

Notes

- 1 Short (or “periodic”): Average value of 3 consecutive sampling periods of at least 30 minutes. Where not practicable a more appropriate procedure may be used.
- 2 TEGCO believe that BAT for this process is “short periodic” subject to confirmation performance as per relevant EA protocols (see below).
- 3 BAT 30 indicates either PCDD/F or PCDD/F + dioxin like PCBs, TEGCO propose PCDD/F.
- 4 Minimum of quarterly during 1st year of operation.
- 5 BAT_{AEL} is 0.06 ng/m³ for “longer term” monitoring.

TEGCO believe that periodic (short) sampling of Hg, PCDD/F & PCBs is appropriate given that RDF is being burned. In order to demonstrate this, “accelerated testing” (twice per month with a minimum of 6 results) in the first year of operation as per EA protocols: -

- 210716 draft mercury CEMS protocol V0.17 (or subsequent protocol extant at commencement of operation);
- 210716 draft PCDD-F protocol V0.10 (or subsequent protocol extant at commencement of operation);

Release Points A3, A4, A5, A6, A7 & A8

Proposed monitoring of these emission points is based on BAT 26 (channelled dust emissions to air from the enclosed treatment of slags and bottom ashes with extraction of air). The BAT AEL value identified also appears in numerous other BREFs/BAT Conclusion documents across various sectors for bag filters, large and small. This indicates that this ELV can be considered BAT for these emissions.

Species/Parameter	Sampling Period ⁽¹⁾	Standards	Frequency	ELVs	
				Value	Source
Particulate matter	Short	EN 13284-1	Annual	5 mg/Nm ³	BAT AEL

Emissions to water

There are no emissions to water from the prescribed activity or process however clean rainwater run-off is to be discharged from the installation. This is via a SUDS system resulting in a maximum discharge flow no higher than predicted green-field run-off rate (and significantly lower than the present uncontrolled run-off from building roof and yard area). TEGCO understand that the EA will require such a discharge to be monitored to demonstrate that there is no contamination and TEGCO propose the following: -

- Flow (daily),
- Flow related daily composite sample,
- pH,
- Temperature,
- COD/BOD,
- Suspended Solids.

This discharge will include wash water from the external surfaces of the air cooled condenser radiators. These will be washed using demineralised water resulting in no risk of contamination.

Initial investigations have led TEGCO to conclude that discharge of domestic sewage (from the offices etc.) to public sewer is excessively costly. TEGCO therefore currently propose to discharge via packaged sewage treatment plant which meets BS 12566 at a rate of up to 5 m³ per day. This will discharge into the clean rainwater run-off detention basin. TEGCO understand that the EA will require such a discharge to be monitored to demonstrate satisfactory ongoing performance of the plant. TEGCO propose the following daily monitoring: -

- Flow,
- pH,
- Temperature,
- COD/BOD,
- Suspended Solids.

Bottom Ash Export, Fly ash and FGCr

Bottom ash has to be suitably characterised prior to export. This includes demonstrating effective burn out of the RDF. The BAT monitoring options available to the Operator are identified in the table below. TEGCO propose to use Total Organic Carbon (TOC): -

Parameter	Sampling Period ⁽¹⁾	Standards	Frequency	Maximums	
				Value	Source
Loss on ignition ⁽¹⁾⁽²⁾	Short	EN 14899 EN 15169 or EN15935	3 monthly	3% Dry wt.	BAT AEPL
Total organic carbon ⁽¹⁾⁽²⁾	Short	EN 14899 EN 13137 or EN15936	3 monthly	5% Dry wt.	BAT AEPL

Notes:

- 1 Either parameter can be used to determine compliance, TEGCO propose to use TOC.
- 2 Elemental carbon (determined by DIN 19539) can be subtracted from the measurement result.

Bottom ash, Fly ash and FGCr all have to be suitably characterised prior to export. Sampling and monitoring will be undertaken in accordance with EA “Technical Guidance Note (Monitoring) M4” (Version 7, June 2016) commonly known as the “EA Ash Sampling Protocol.”

Other Wastes

All other wastes will be characterised as required by the Waste Management Regulations and transferred via licence waste carriers to appropriate licenced facilities for disposal, reuse or recovery.