INTRODUCTION

framework of its legal competences, requests operators of Large Combustion Plants (LCPs) in the country to submit a specific set of data. This data collection will:

- be used to develop an Inventory of Large Combustion Plants that will help to implement existing and future
- support LCP operators with a timely and smooth fulfilment of their legal obligations regarding the submissio
- provide the MoEU and the LCP operators with a package of information that will help them improve both en

The data request in this Questionnaire is based on a selection of the most relevant data needed under Turkish law and included in extensive technical documents on best available techniques for LCPs. The request will only concern the most significant data in the energy and other industrial sectors that operate large combustion plants, such as: their number, locations, technical and operational characteristics, and environmental impact.

The LCP Inventory will be the point of departure for the development of a Regulatory Impact Assessment on LCPs, and for public administration's legal implementation action plans and institutional (re)organisation.

The Questionnaire aims at making a brief though solid snapshot of the Turkish LCPs that are currently operational as well as those that are planned to be taken into operation from now until 1 January 2016. The Questionnaire does not distinguish along the lines of 'existing' and 'new' plants, a distinction that is often - and with even diverging definitions - made under national and international legal requirements regarding LCPs. The Questionnaire is solely meant as a tool to collect **specific and correct** information that will help drawing

The Questionnaire has been developed in the framework of an EU-Turkey funded project. Further details of this project and concerning the Questionnaire can be found on the project website: http://byt.cevre.gov.tr

The deadline for submission of the fully filled in Questionnaire is

15.Oca.15

legal requirements that relate to these plants;
n of data to the MoEU by March 2015 as per the 2010 LCP by-law;
vironmental conditions and the operators' economic development.

GLOSSARY

This glossary is created to facilitate the understanding of the structure, context and a number of key terms contained in the Questionnaire. More specific terms are explained in the Questionnaire under the 'note' cell.

Terminology	Explanation
Air staging	Design of the combustion process in which low excess air levels are used in the primary combustion zone with the remaining (over-fire) air added higher in the furnace to complete the combustion.
Auxiliary systems	Systems necessary for the complete operation of the combustion plant: unloading, fuel handling and storage, fuel pre-treatment (grinding, drying and washing process), chemical product handling and storage, steam generation system, hot water generation system, cooling systems, raw water treatment, flue gas treatment, waste water treatment, by-product/residue/waste handling and storage. Auxiliary systems may be shared among several combustion plants within the same combustion installation.
BAT	Best Available Techniques
BATAEL	Best Available Techniques Associated Emission Level – the range of emission levels obtained under normal operating conditions using a best available technique or a combination of best available techniques, as described in BAT conclusions of the BREF document, expressed as an average over a given period of time, under specified reference conditions.
Best Available Techniques	The most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environment as a whole. 'Techniques' shall include both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned. 'Available Techniques' means those developed on a scale which allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages, whether or not the techniques are used or produced inside the (Member) State in question, as long as they are reasonably accessible to the operator. 'Best' means most effective in achieving a high general level of protection of the environment as a whole.
BREF	Best Available Techniques Reference Document
CEMS	Continuous Emissions Monitoring Systems
CEMS uncertainty	The uncertainty assigned to a measured result represents the size of the region around the result in which 'true value' is expected to lie with a specified level of confidence (for example in 95 times out of 100, the result will be within these bounds); the range of dispersion is inherent to the measurement approach and technique. For each pollutant monitored the uncertainty of measurement should be reported.
Combustion unit	Any boiler/turbine/engine used for generating heat, excluding the following: process furnaces or process heaters, post-combustion plants and flares and incineration plants.
Combustion plant	The combustion plant may be composed of several combustion units in case where the flue gases released from the combustion units are not monitored separately and are mixed in one common stack.
Combustion installation	An installation may comprise one or more combustion plants and their associated auxiliary systems.
Conventional Fuel	Fuels with a known composition which remains relatively constant. Coal, lignite, biomass, peat, liquid and gaseous fuels (including hydrogen and biogas) are regarded as conventional fuels, and waste used as a secondary fuel.
Desulphurisation rate	The ratio over a given period of time of the quantity of sulphur which is not emitted into air by a combustion plant to the quantity of sulphur contained in the solid fuel which is introduced into the combustion plant and which is used in the plant over the same period of time.
Diesel engine	An internal combustion engine which operates according to the diesel cycle and uses compression ignition to burn fuel.
End-of-pipe	An approach to pollution control which occurs at the end of the process stream treatment prior to discharge into the environment, as opposed to pollution prevention which implies making changes in the process giving rise to the wastes.
Energy efficiency	For power plants, energy efficiency is considered as the heat rate (fuel input energy/energy output at power plant border). The fuel energy is measured as the lower heating value.
FGT	Flue gas treatment
Fuel pre-treatment	Any equipment/process which modifies the characteristics of the fuel from 'as received' to 'just before combustion'.
Fuel staging	Design of the combustion process in which different portions of fuel(s) are used at different levels of the combustion chamber in order to obtain more favourable combustion process characteristics. The term 're-burning' is also used.
Gas engine	An internal combustion engine which operates according to the Otto cycle and uses spark ignition or, in case of dual fuel engines, compression ignition to burn fuel.
Gas turbine	Any rotating machine which converts thermal energy into mechanical work, consisting mainly of a compressor, a thermal device in which fuel is oxidised in order to heat the working fluid, and a turbine.
Gross electric power output	The direct measurement of the electrical output of the electrical generator.
Gross heat output	The direct measurement of the heat output of the heat generator.
ELV	Emission Limit Value
IED	Industrial Emissions Directive 2010/75/EU
Indigenous fuel	A naturally occurring fuel fired in a combustion plant specifically designed for that fuel and extracted locally.
Industrial installation	Stationary technical unit within which one or more activities listed in Annex I of Industrial Emissions Directive 2010/75/EU are carried out, and any other directly associated activities on the same site which have a technical connection with the activities listed in Annex I and which could have an effect on emissions and pollution.
IPPC	Integrated Pollution Prevention and Control
IPPCD	Integrated Pollution Prevention and Control Directive 2008/01/EC
LCP	Large Combustion Plant
LCPD	Large Combustion Plant Directive 2001/80/EC
Lower heating value (LLV)	The heat produced by combusting one unit of a substance, at atmospheric pressure under conditions such that all water in the products remains in the form of vapour. The net heat of combustion is calculated from the gross heat of combustion at 20°C by subtracting 572 cal/g (1030 Btu/lb) of water derived from one unit mass of sample, including both the water originally present as moisture and that formed by combustion. This subtracted amount is not equal to the latent heat of vaporisation of water because the calculation also reduces the data from the gross value at constant volume to the net value at constant pressure. The appropriate factor for this reduction is 572 cal/g.
Main activity	If an installation covers more than one activity from the list of activities offered under question number 2.1, a 'main activity' is defined by the operator for that installation. The main activity in most of the cases actually represents the main economic activity of the installation. When the main economic activity is not representative of the processes undertaken at the installation, the main activity may be associated with the most polluting activity of the installation.
Main fuel(s)	Fuel or a combination of fuels used during normal operating conditions of the combustion plant. For example during the periods of start-ups and shutdowns other fuels may be used.
Minimum start-up load for sta	Defined as the minimum load compatible with the steady operation of the combustion plant following start-up after which the plant is able to operate safely with the supply of 'main fuel(s)' only.
Minimum shutdown load for s	Minimum load at which point the combustion plant can no longer safely operate with the supply of 'main fuel(s)' only. The minimum shutdown load for stable generation may be lower than the minimum start-up load for stable generation as the combustion plant may be able to operate stably at a lower load once it has reached a sufficient temperature following a period of operation.
Multi-fuel firing combustion p	Any combustion plant which may be fired simultaneously or alternately by two or more types of fuel.
Nm3	Unit of volume at normal conditions – temperature of 273,15 K and pressure of 101325 Pa (or standard conditions as per Turkish By-Law on Large Combustion Plants (Official Journal No. 27605 of 8 June 2010), LCP Best Available Techniques Reference Document and Large Combustion Plants Directive 2001/80/EC).
NOx	The mixture of NO and NO2 expressed as NOx.
Normal operating conditions	The conditions during which a combustion plant is operating and discharging emissions into the air, excluding other-than-normal operating conditions.
Operator	Any natural or legal person who operates or controls in whole or in part the industrial installation or combustion installation.
Operating hours	The conditions during which a combustion plant is operating and discharging emissions, excluding start-up and shutdown periods.
Other-than-normal operating	The following examples are considered other-than-normal operating conditions: unplanned shutdowns, malfunctioning or breakdown of the abatement equipment or part of the equipment for which no derogation was granted by the competent authority under the Turkish legislation, leaks, testing of new fuels/techniques, malfunctioning of instruments related to the process control, malfunctioning of instruments for emission monitoring, and other.
Periodic measurement	A sampling campaign, where during a pre-defined period of time (half-hour, 1 hour, 6 hours) a parameter is analysed continuously (the 'final' value is calculated as the average of the whole data set obtained during the period). This may also be understood as the analysis of a composite sample taken continuously over a period of time.
Permit	A written authorisation to operate all or part of an industrial installation or combustion installation.
Primary measures to reduce e	Integrated measures to reduce emissions at source or during combustion, including:
	Fuel-supply measures
	Combustion modifications
Reciprocating engine	A heat engine that uses one or more reciprocating pistons to convert the pressure of the flue gas generated in the combustion process into a rotating motion.
Reference year	2013 should be used as the reference year for operational data in the Questionnaire. All the data reported should refer to the same year. If data is not available for that year or if it does not appropriately represent the current operational conditions, use 2012 or 2011, as long as the data is from the same year.
Rolling average	The rolling period over 5 years is an important parameter for understanding the operational mode of the combustion plant. Therefore, by default, the rolling average should be considered over the preceding 5 years. If the plant has been recently constructed or if there has been a major retrofit during this period that significantly changed the performance of the combustion unit, please indicate the number of years considered for the rolling average value.
Secondary measures to reduc	End-of-pipe measures. Those that control emission to air, water and soil.
SOx	The mixture of SO2 and SO3 expressed as SOx.
Stack and Common Stack	A stack is a structure containing one or more flues providing a passage for waste gases in order to discharge them into the air.
	The definition for common stack is in relation with the definition of a combustion plant: a combustion plant represents all combustion units releasing flue gases through a common stack.
Start-up and shutdown period	Start-up period is the operation before reaching minimum start-up load for stable conditions. A shutdown period is defined as operation after reaching minimum shutdown load for stable conditions. A shutdown period can involve a gradual turning down of the process. Minimum loads relate to technical characteristics of the combustion unit and not the minimum environmental requirements of the combustion plant and its auxiliary systems; emissions can be a-typical during these operations, although not necessarily always higher. The periods during which a combustion plant is operating stably and safely with supply of the 'main fuel(s)' but without the export of heat and/or electricity are not included in the start-up or shutdown periods. For the combustion plant which consists of two or more combustion units, the start-up/shutdown period is defined by at least one combustion unit being in that phase.
Total rated thermal input	The rate at which any fuel (or a combination of fuels) can be burned at the maximum continuous rating of the combustion unit multiplied by the lower heating value of the respective fuel(s) usually is expressed as MWth. The total rated thermal input of a combustion plant is the sum of the total rated thermal inputs of each of its units (where the combustion plant is composed of more than one combustion unit).
vol-%	Volume per cent
wt-%	Weight per cent

SCOPE OF THE QUESTIONNAIRE

It would be worthwhile to primarily recall which installations/plants/units are covered by the definition of the Large Combustion Plants Directive (LCPD) (2001/80/EC) transposed into Turkish legislation with the adoption of the By-Law on Large Combustion Plants (Official Journal No. 27605 of 8 June 2010). Article 2, paragraph (7) of the LCPD defines a combustion plant as:

'…any technical apparatus in which fuels are oxidised in order to use the heat thus generated. This Directive shall apply only to combustion plants designed for production of energy with the exception of those which make direct use of the products of combustion in manufacturing processes.'

Combustion Plants thereby cover all kinds of conventional power plants, including:
Utility boiler plants;
Combined heat and power plants; and
District heating plants.

Combustion plants are also found in a range of industrial sectors if they use conventional fuel (please see the 'Glossary' for the meaning of 'conventional fuel').
They are divided as follows:
- Crude oil refineries;
- Iron and steel works;
- Non-ferrous metal production;
- Chemicals;
- Paper;
- Food;
- Textile; and other.

The Large Combustion Plant Directive deals with combustion installations with a rated thermal input equal to or greater than 50 MW. Smaller units can be possibly aggregated into larger installations exceeding 50 MW.

List of Plants not covered by this Questionnaire:

Plants in which the products of combustion are used for the direct heating, drying, or any other treatment of objects or direct heating, drying, or any other treatment of objects or materials (for example reheating furnaces, furnaces for heat treatment)
Post-combustion plant, for example any technical apparatus designed to purify the waste gases by combustion that is not operated as an independent combustion plant
Facilities for the regeneration of catalytic cracking catalysts
Facilities for the conversion of hydrogen sulphide into sulphur
Reactors used in the chemical industry
Coke battery furnaces
Cowpers (blast furnaces)
Cement kilns
Waste incinerators
Any technical apparatus used in the propulsion of a vehicle, ship or aircraft
Gas turbines used on offshore platforms

IMPORTANT NOTE

In this questionnaire, a combustion plant is defined as having only one flue-gas release point where air emissions are monitored. Furthermore, it is understood that the combustion plant may be composed of several combustion units only if the flue-gases released from the combustion units are not monitored separately and are mixed in one stack. **Therefore, one questionnaire refers to one reference combustion plant.**
Please note that within the same combustion installation, several plants can be proposed as reference combustion plants and the questionnaire should be filled in for each one of them.
Users should start with empty questionnaire and immediately ,using save as option, save the file giving appropriate name.
If there is more than one LCP within the installation users can repeat the process i.e. start with empty document for the second plant or
Once the questionnaire is completed for the first plant, the whole questionnaire file may be copied, renamed and the information therein may be corrected, where appropriate, to reflect the operation of the next plants.

STRUCTURE OF THE QUESTIONNAIRE

The questionnaire is divided into 2 parts A and B:

PART A - BASIC INFORMATION

Basic Administrative Information
Basic Technical Information
Basic Operational Information
PART A is divided in the following 5 pages (sheets) :

1. Installation
2. Combustion Plant (LCP)
3. Combustion Units
4. Fuels
5. LCP Air Emissions

PART B - ASSESSMENT OF THE IMPLEMENTATION OF AIR EMISSIONS RELATED BEST AVAILABLE TECHNIQUES (BAT)

Best Available Techniques (BAT) compliance - the LCP operators are offered questions that can be simply responded to with 'YES' or 'NO' as concerns their compliance with each of the BATs offered. If the answer is 'NO', the operator is asked to briefly describe the technique applied in its production process.
Data entry related to PART B should be done using pages (sheets):

1. Best available techniques (BAT) for Solid Fuels
2. Best available techniques (BAT) for the combustion of liquid fuels
3. Best available techniques (BAT) for the combustion of gaseous fuels
4. Best available techniques (BAT) specific for the energy systems of mineral oil and gas refineries

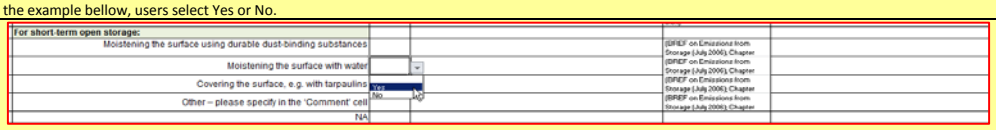
NAVIGATION AND DATA ENTRY

Users navigate through the questionnaire selecting relevant pages.
In general, users are advised to follow the order of pages (during data entry process) i.e. from left to right.
However it is allways possible to go back to specific page to check of correct already entered information.

All pages are organized in the same way: question, answer, comment cell and note.
Answers (information) is entered in the following way:
- For text or numeric data users enter information directly typing the data.

Comments cells have already set WRAP TEXT and AUTO ROW HEIGHT properties ON.
(Note: pressing Alt-Enter keys simultaneously inserts new row in the same cell)
- When entering numeric data with decimals users should use standard delimiter (. or ,) depending on the settings in their copy of MS Excel.
- Dates should be entered using dd.mm.yy format ie. day, month, year.
- Most of the questions users will answer by selecting option from the drop down list with predefined answers.

In the example bellow, users select Yes or No.



In PART B, which is about Best Available Techniques (BAT) compliance the LCP operators are offered questions that can be simply responded to with 'YES' or 'NO' as concerns their compliance with each of the BATs offered. If the answer is 'NO', the operator is asked to briefly describe the technique applied in its production process.

In case none of the options is applicable users shall select Option 'other' and enter their information (in brief) in the COMMENT CELL.

GENERAL INSTRUCTIONS

1. The operators are kindly requested to submit the information that is available and/or that is possible to collect. Partial information is also acceptable and useful, however every effort to make it complete is deemed necessary. Operators are encouraged to submit also any extra/additional relevant information.

2. 2013 should be used as the reference year for operational data in the Questionnaire. All the data reported should refer to the same year. If data is not available for that year or if it does not appropriately represent the current operational conditions, use 2012 or 2011, as long as the data is from the same year.

3. More specific instructions and guidance are provided in the endnotes and/or accompanying questions to further facilitate the completion of the Questionnaire. The Questionnaire also allows for clarification comments in the 'Comment' cell. The abbreviation 'NA' should be used where data is not available and/or where the question is not applicable to the case. If certain data cannot be presented in the proposed format, the corresponding cell should be also marked as 'NA' and reported in the 'Comment' cell.

4. Leaving empty/unchecked cells is not recommended.

5. Where different answers/options are offered the Questionnaire should be filled in by checking one or more boxes (depending on the question and corresponding answer(s)).

6. Data should be provided for each combustion plant where an installation consists of several combustion plants (please see 'Glossary' for the definition of a 'combustion plant'). A number of questions will refer to combustion unit level (for example the technology/techniques applied and fuels used).

7. All the data shall be submitted in the units requested by the Questionnaire.

8. The same numbering of stacks, combustion plants and combustion units shall be used in all sections of the Questionnaire.

9. If a combination of fuels occurs (for example - gas engine using gaseous fuel in one period and liquid fuel in another period of the year), the Questionnaire should be filled in for each fuel, specifying the number of operating hours of the use of the specific fuel and related information from the Basic operational information. This does not apply if different fuels are used during the periods of start-ups and shut-downs (please see 'Glossary' for the definition of 'Start-ups and shut-downs') and other-than-normal operating conditions (please see 'Glossary' for the definition of 'other-than-normal operating conditions').

10. Measurement results of air emission levels shall be provided for each stack which corresponds to combustion plant emission levels (please see Glossary for the meaning of 'combustion plant').

11. If some additional documents (graphs, schemes, diagrams, and other) are provided with the Questionnaire, this should be noted in the corresponding 'Comment' cell. For some of the techniques/best available techniques (for example NOx control by selective non-catalytic reduction using NH3 (ammonia), and SOx control by furnace injection of lime) there is no specific major equipment (apart from injection mechanism for chemicals and water). That being the case, such techniques should be identified in the flow diagram (if submitted) by only defining the location of major use of chemicals and water.

12. Energy efficiency is assessed on the combustion plant level, regardless of the number of combustion units.

13. District heating improves the energy efficiency of the combustion plant. However, it is normally used only during one part of the year (energy efficiency of the combustion plant is different in different parts of the year). Therefore, for this case, in the 'Comment' cell for the reference year additional information should be provided separately for the period when district heating is used and for the period when it is not used.

14. Confidential information shall be clearly reported in the 'Comment' cell and it will be treated pursuant to Turkish legislation.

15. If difficulties arise in completing this Questionnaire, please do not hesitate to send an email message to sanayi.hava@csb.gov.tr or to contact the Foster Wheeler/PM project office in Ankara on telephone number 0312 4961601. You may ask for Ms. Sinem Yilmaz, Ms. Dara Belić or Mr. Pat Swords.

The deadline for submission of the fully filled in Questionnaire is

15 JANUARY 2015

BASIC ADMINISTRATIVE INFORMATION

QUESTION	ANSWER	COMMENT
Name of the legal entity (operator) holding the operation permit of the combustion installation or industrial installation	Irish Electricity Supply Board	
Name of the parent Company (if any)		
Tax number of the combustion installation or industrial installation		
Date of registration		
Nomenclature of Economic Activities (NACE) code		
Location of the combustion installation		
Province	Moneypoint, Kilrush, Co. Clare, Ireland	
City		
Address		
Geographic (GIS) location		
Longitude		
Lattitude		
Contact person		
Name		
Correspondence address		
Contact telephone		
Email address		
Number of employees at the combustion installation or industrial installation		
Characteristics of the location - please check (y/n) one or more boxes		
Urbanised zone (y/n)	No	
Industrial zone (y/n)	No	
Nature protection area (y/n)	Yes	
Cultural heritage (y/n)	No	
Lowland area (y/n)	Yes	
Mountain area (y/n)	No	
Other (y/n) please specify in the 'Comment' cell	Yes	Local Natura sites in surrounding estuary (Lower River Shannon Special Area of Conservation)

COMBUSTION PLANT			
Question	**Answer**	**Comment**	**Note**
Production data			
Combustion Plant Number	**1**	**This is the main stack with two combustion units. The second stack contains one combustion unit only as the fourth unit was never installed at the site.**	
nce assessment study been carried out for the combustion plant?	Yes	**As part of IPPC application**	
Total rated thermal input of the combustion plant (MW_{th})	1.626	Each unit is about 305 Mwe with an efficiency of about 37.5%	please see 'Glossary' for the definition of a 'combustion plant'
Gross electric power output of the combustion plant, where applicable (MW_{el})	610		
Gross heat output of the combustion plant, where applicable (MW_{th})	N/A	Plant operates in condensing mode for electrical generation only	
Start-up of Combustion Plant operation date (dd.mm.yy)	01.05.1985		For combustion plant that is currently in operation within the installation. (please see 'Glossary' for the definition of 'combustion installation', 'industrial installation' and 'combustion plant')
Planned date of commencement of operation of combustion plant (dd.mm.yy)		N/A	For combustion plant within the installation that is currently not yet in operation but will be so before 1 January 2016. (please see 'Glossary' for the definition of 'combustion installation', 'industrial installation' and 'combustion plant')
Reference year	2013		(please see 'Glossary' for the definition of 'reference year')
Number of operating hours and rolling average over the last 5 years (h)	8.760		(please see 'Glossary' for the definition of 'rolling average' and 'combustion plant')
Energy efficiency at the design point [17] (%)	37,5		
Stacks' characteristics			
Height (m)	220	220 m above ground	
Inner diameter (m)			
Surface (m^2)			
Geographic (GIS) coordinates of the Stack			
Longitude			Bboth in ED 1950, decimal degrees format. Freeware utility to convert from degrees to decimal format at http://twcc.free.fr/
Lattitude			
Gas characteristics at the Stack			
Gas flow Nm^3/h	2.400.000	Each Combustion Unit is 1,200,000 Nm^3/h	
Temperature ^oC			
H_20 wt vol-%			
CO_2 wt vol-%			
O_2 wt vol-%		Reference value is 6% oxygen when operating on coal	
Waste gas abatement technologies/techniques applied			
Please indicate how the combustion units are connected to the stack ([7])	**Combustion Units A1-1 and A1-2 are connected to Stack 1**		
Please provide for a brief description and/or flow diagram of the air emissions treatment system	**Low Nox burners, SCR DeNOx follwoed by electrostatic precipation and desulphurisation**		

[7] For example: Combustion units 1 and 3 are connected to stack 1 (forming combustion plant 1); combustion units 2, 4 and 5 are connected to stack 2 (forming combustion plant 2)

[17] Annual average plant efficiency should be provided, based on the lower heating value (or net calorific value) of the used fuel and taking account of all energy imports and exports across the site boundary, only referring to the combustion plant and its auxiliary systems and not the whole combustion/industrial installation (please see Glossary for the meaning of 'lower heating value'). The data reported should refer only to the normal operating conditions and its auxiliary systems during the reference year. For gas turbines Energy Efficiency is the gas turbine efficiency at ISO base load conditions expressed as a percentage – please see the Industrial Emissions Directive 2010/75/EU, Annex V, Parts 1 and 2

Combustion Units

Questions	CU1	CU2	CU3	CU4	CU5	Comment
Total rated thermal input of the combustion unit (MW_{th})	813,00	813,00				(please see 'Glossary' for the definition of 'combustion unit')
Gross electric power output of the combustion unit, where applicable (MW_{el})	305,00	305				
Gross heat output of the combustion unit, where applicable (MW_{th})	N/A					
Type of Combustion Unit - Select	Boiler	Boiler				
Start-up of operations date of the combustion unit (dd.mm.yy)	01.05.1985					For combustion unit that is currently in operation (please see 'Glossary' for the definition of 'combustion unit')
Planned date of commencement of operation (dd.mm.yy)						For Combustion Unit(s) that is currently not yet in operation but will be so before 1 January 2016
Boiler						
Boiler Type - Select	Pulverised solid fuel firing	Pulverised solid fuel firing				
Boiler Combustion combustion process characteristics						(please check one or more boxes)
Air staging (Y/N)	Yes	Yes				
Fuel staging (Y/N)	No	No				
Flue gas recirculation (Y/N)	No	No				
Other – specify in the comment cell						
Gas Turbine						
Gas Turbine type - Select						
Number of fuels for which the gas turbine has been designed to operate - Select						
Reciprocating engine						
Number of fuels for which the engine has been designed to operate - Select						
Other						
Specify combustion technology/techniques applied (briefly)						
Primary measures to reduce air emissions						(please see 'Glossary' for the meaning of 'PRIMARY measures')
Fuel switch ([2]) (Y/N)	No	No				([2]) The use of fuels with a lower content of sulphur, nitrogen, carbon, and other
Capacity de-rating ([3]) (Y/N)	No	No				([3])Reduced temperature (air pre-heat); lower volume flow and higher oxygen surplus; and other
Air and fuel modifications ([4]) (Y/N)	No	No				([4]) Pre-drying; gasification; pyrolysis of fuel; fuel additives; lime and limestone injection for fluidised bed combustion; and other
Burner modification ([5]) (Y/N)	Yes	Yes				([5]) Low NOx burners; liquid removal of ash; and other
In-furnace combustion modifications ([6]) (Y/N)	Yes	Yes				([6]) Staged combustion and re-burning; optimised combustion; and other
Other – please specify in the 'Comment' cell						
Secondary measures to reduce air emissions						(please see 'Glossary' for the meaning of 'SECONDARY measures')
Electrostatic precipitators **ESP** (Y/N)	Yes	Yes				
Fabric filters **FF** (Y/N)	No	No				
Wet scrubbers (Y/N)	No	No				
Dry scrubbers (Y/N)	Yes	Yes				
Cyclones (Y/N)	No	No				
Flue gas desulphurisation (Y/N)	Yes	Yes				
Selective catalytic reduction (Y/N)	Yes	Yes				
Selective non-catalytic reduction (Y/N)	No	No				
Other – please specify in the comment cell						

'Comment' cell

Combustion unit	Combustion Unit 1 (CU1)				Combustion Unit 2(CU2)				Combustion Unit 3 (CU3)				Combustion Unit 4 (CU4)			
Fuel	**Fuel 1**	**Fuel 2**	**Fuel 3**	**Comments**	**Fuel 1**	**Fuel 2**	**Fuel 3**	**Comments**	**Fuel 1**	**Fuel 2**	**Fuel 3**	**Comments**	**Fuel 1**	**Fuel 2**	**Fuel 3**	**Comments**
Fuel physical state - Select	Solid	Liquid			Solid	Liquid										
Fuel Type - Select	Hard Coal	Petroleum			Hard Coal	Petroleum										Heavy Fuel Oil is secondary fuel
Indigenous fuel - (y/n) [9] (please see 'Glossary' for the definition of 'Indigenous fuel')	No	No			No	No										
Fuel Consumption t/h	118				118											
Fuel Consumption t/y	1.346.666	33.768			1.346.666	33.768										
Fuel Characteristics [9]																
Lower heating value (in MJ/kg for solid and liquid fuels; in MJ/Nm3 for gaseous fuels)	24,7	40,5			24,7	40,5										
Moisture (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)	12	0			12	0										
Volatiles (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)	40				40											
Ash (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)	7	0,15			7	0,15										
S total (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)	1	1			1	1										
N (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)																
C (in wt-% for solid and liquid fuels; in vol-% for gaseous fuels)																
Fuel pre-treatment [10]																
Size reduction ([1]) (Y/N)	Yes	No		In ball mill	Yes	No										Ball mill and drying as single unit
Drying y/n	Yes	No		In ball mill	Yes	No										
Contaminant removal ([2]) y/n	No	No			No	No										
Desulphurisation rate % (if applicable)	N/A	N/A			N/A	N/A										

[9] Relevant as per Annexes I and V of the By-Law on Large Combustion Plants (Official Journal No. 27605 of 8 June 2010); and Paragraph 31 of the Preamble, Paragraph 1 of Article 31, and Annexes V and VI of the Industrial Emissions Directive 2010/75/EU.

[9] Fuel characteristics 'as received' are likely to be available. It is advised to check with the fuel supplier what additional data is possible to be obtained. However, given that one of the interests of this data collection exercise is to link the fuel characteristics to air emissions, it may also be appropriate to use 'just before combustion' data. Therefore, if some additional information as to how 'as received' or 'analysis provided by the fuel supplier' values differ from 'just before combustion' (for instance, due to stockpiling), please provide it in the 'Comment' cell.

[10] If some other processes significantly influence the 'just before combustion' fuel data (for example 'washing' of the fuel due to stockpiling), it should be provided as additional information in the 'Comment' cell

([1]) Shredding, crushing, milling, pulverising, and other

([2]) For example ash, sulphur and other (please specify in the 'Comment' cell)

Air emissions report	Total annual emissions (t/y)	Daily average (mg/Nm^3) [14]	Uncertainty of a single masurement for 95% confidence interval (%) [15]	Is the CEMS uncertainty already subtracted from the emissions levels of Dust, SO_2 and NO_x (Y/N)	Comments
Air emission levels of **Dust** as total suspended particles	211,00	150,00	30,00	Yes	Data From Annual Environmental Report
Air emission levels of **SO_2**	5.961	2.000	20	Yes	CEMS complies with Irish EPA Requirements including EN 15267-3
Air emission levels of **NO_x**	3.763	1.100	20	Yes	Maximum license limits as daily average but Moneypoint also subject to National Emission Reduction Plan with annual emisions ceillings in tonnes
Monitoring method					
Select	Continuous				
Continuous Emissions Monitoring System (CEMS) [16]					
Select	Approved				EPA has defined requirements for QAL1, QAL2, QAL3

[14] Based on daily average, standard conditions and an O_2 level of 6% for solid fuels; 3% for liquid and gaseous fuels; and 15% for gas turbines, which represents a typical load situation

[15] See Section 5, Article 18, Paragraph 8 of the By-Law on Large Combustion Plants, Official Journal No. 27605 of 8 June 2010

[16] Pursuant to the Ministerial Decree on Continuous Measurement Systems, Official Journal No. 28082 of 12 October 2011.

'Comment' cell

PART B ASSESSMENT OF THE IMPLEMENTATION OF AIR EMISSIONS RELATED BEST AVAILABLE TECHNIQUES (BAT)

Note:
Users should answer (fill) the questionnaire for every type of fuel that is used on the LCP.
Users can navigate using the menu (hyperlinks) above or directly go to the related pages (sheets).

In Part B Best Available Techniques are presented that have been extracted from BREF documents relevant for the scope and purpose of this Questionnaire:

BREF for Large Combustion Plants (July 2006) ;

BREF on Emissions from Storage (July 2006);

BREF for Mineral Oil and Gas Refineries (February 2003) .

The BREF document for Large Combustion Plants is currently under revision pursuant to the procedure stipulated in the Industrial Emissions Directive (IED) 2010/75/EU. The first draft of the revised BREF was finalised in June 2013. The BREF for Mineral Oil and Gas Refineries (February 2003) has undergone the same revision methodology. The final draft dating July 2013 has been sent to the *'IED Article 13 Forum'* for its opinion. If any of the final versions of the two revised BREF documents will be adopted by the European Commission before May 2016, the updates relevant for this Questionnaire will be used to update this Questionnaire.

BREF documents listed above can be downloaded from the project website: http://byt.cevre.gov.tr.

All vertical[18] and horizontal[19] BREF documents, as well as Reference Documents (REF) for specific horizontal industrial issues (Economics and Cross-Media Effects, Monitoring of Emissions) can be found at the website of the European IPPC Bureau (EIPPCB) of the Joint Research Centre (JRC): http://eippcb.jrc.ec.europa.eu/.

[18] Developed for one specific industrial sector

[19] Which include information of a generic nature that can be used across many industrial sectors

INSTRUCTIONS FOR PART B

(Should be read together with 'General Instructions')

1. Part B of the Questionnaire shall be completed for every combustion plant individually in different iterations (please see 'Glossary' for the definition of a 'combustion plant'). The questions should be responded with 'YES' or 'NO' as concerns compliance with the BATs presented. The abbreviation 'NA' should be used where data is not available and/or where the question is not applicable to the case. If certain data cannot be presented in the proposed format, the corresponding cell should be also marked as 'NA' and reported in the 'Comment' cell.
2. Leaving empty/unchecked cells is not recommended.
3. For BAT compliance assessment purpose a limited number of questions from Part A are repeated. In a fewer number of cases a selection of specific answers is offered to be checked (other than 'YES' or 'NO'). Part B of the Questionnaire also allows for additional information and clarifications in the 'Comment' cell.
4. Each of the thematic areas/sections against the fuel used (storage and handling of fuels; fuel pre-treatment; combustion technology/technique; BAT for DUST, SO_2 and NO_x abatement; and other) shall be completed in two steps. First step: all the proposed boxes shall be checked in one run. Second step: in cases where the BATs offered are not implemented (most or all of the answers are 'NO'), description of the implemented techniques for the operation of the subject combustion installation/plant shall be briefly described in the appropriate 'Comment' cells, which entails a return to the beginning of the thematic area/section.
5. The 'Comment' cell shall be used wherever information at the level of a combustion unit is deemed necessary, where a combustion plant consists of more than one combustion unit (please see 'Glossary' for the definition of 'combustion unit' and 'combustion plant').
6. The last section of the Questionnaire - 4. 'Best Available Techniques (BAT) Specific for the Energy Systems of Mineral Oil and Gas Refineries' addressing BATs for Refining of Mineral Oil and Gas industry, is to be completed only by the sector concerned.

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BEST AVAILABLE TECHNIQUES (BAT) FOR THE COMBUSTION PLANTS FIRING SOLID FUELS

BAT FOR STORAGE AND HANDLING OF SOLID FUELS

BAT Description/ BREF reference	Answer (Y/N)	Comment	BREF	Note:
(1) **Primary measures:** appliance of enclosed storage by using, for example, silos, bunkers, hoppers and containers, to eliminate the influence of wind and to prevent the formation of dust by wind as far as possible. Where silos are not applicable, storage in sheds can be an alternative. This is, e.g. the case if apart from storage, the mixing of batches is needed	No	Coal yard is used, but coal is transferred to bunker in enclosed power plant prior to use	(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	(1) Note: For (very) large quantities of not or only moderately drift sensitive and wettable material, open storage might be the only option.
For open storage: carrying out regular or continuous visual inspections to see if dust emissions occur and to check if preventive measures are in good working order	Yes	Dust levels are monitored, but climatic conditions are characterised by Atlantic Westerlies and rain	(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
For long-term open storage:			(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Moistening the surface using durable dust-binding substances	Yes	Coal is keept moist by natual environment and use of water sprays when extended dry periods occur	(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Covering the surface, e.g. with tarpaulins	No		(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Solidification of the surface	No		(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Grassing-over of the surface	Yes	Coal ash deposit is grassed over	(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Other – please specify in the 'Comment' cell			(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
For short-term open storage:				
Moistening the surface using durable dust-binding substances	No		(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Moistening the surface with water	No		(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Covering the surface, e.g. with tarpaulins	No		(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
Other – please specify in the 'Comment' cell	Yes	Short tarm storage is in bunker inside power plant	(BREF on Emissions from Storage (July 2006); Chapter 5.3.1)	
NA				
Appliance of enclosed storage by using, for example, silos, bunkers, hoppers and containers.	Yes	Conveyors to power station are enclosed and bunker is inside building	(BREF on Emissions from Storage (July 2006); Chapter 5.4.2)	Where silos are not applicable, storage in sheds can be an alternative. This is, e.g. the case if apart from storage, the mixing of batches is needed
Prevention of dust dispersion due to loading and unloading activities in the open air, by scheduling the transfer as much as possible when the wind speed is low	No	Area tends to be windy, but enclosed transfer system is used from jetty onwards	(BREF on Emissions from Storage (July 2006); Chapter 5.4.1)	
For loading/unloading activities: minimisation of the speed of descent and the free fall height of the product	Yes		(BREF on Emissions from Storage (July 2006); Chapter 5.4.1)	
For all types of substances: design of conveyor to conveyor transfer chutes in such a way that spillage is reduced to a minimum. A modelling process is available to generate detail designs for new and existing transfer points	Yes	Conveyor to conveyor transfer points are inside enclosed towers	(BREF on Emissions from Storage (July 2006); Chapter 5.4.2)	
For non- or very slightly drift sensitive products and moderately drift sensitive, wettable products: the use of an open belt conveyor and additionally, depending on the local circumstances, one or a proper combination of other techniques (lateral wind protection, lateral wind protection, and/or belt cleaning).	No		(BREF on Emissions from Storage (July 2006); Chapter 5.4.2)	
For highly drift sensitive products and moderately drift sensitive, non-wettable products: the use of closed conveyors, or types where the belt itself or a second belt locks the material.	Yes		(BREF on Emissions from Storage (July 2006); Chapter 5.4.2)	

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COAL AND LIGNITE FIRED COMBUSTION PLANTS

BAT description/BREF reference	Answer (Y/N)	Comment	BREF	Note:
BAT FOR FUEL PRE-TREATMENT IN COAL AND LIGNITE FIRED COMBUSTION PLANTS				
Blending and mixing of fuel in order to ensure stable combustion conditions and to thus reduce peak emissions.	Yes	Use of coal yard for blending purpose	(BREF for LCPs (July 2006); Chapter 4.5.3)	
Switching fuel, for example from one coal to another coal with a better environmental profile.	Yes	Sulphur content in fuel is controlled to ensure emission standards are met	(BREF for LCPs (July 2006); Chapter 4.5.3)	
BAT FOR COMBUSTION IN COAL AND LIGNITE FIRED COMBUSTION PLANTS				
For the combustion of coal and lignite, pulverised combustion, fluidised bed combustion as well as pressurised fluidised bed combustion and grate firing are all considered to be BAT for new and existing plants. Grate firing should preferably only be applied to new plants with a rated thermal input below 100 MW. **Select the techniques applied in your process from the following list (rows from 32 to 37)**			BREF for LCPs (July 2006) Chapter 4.5.4	
Pulverised combustion **(PC)**	Yes			
Circulating fluidised bed combustion **(CFBC)**	No			
Bubbling fluidised bed combustion **(BFBC)**	No			
Pressurised fluidised bed combustion **(PFBC)**	No			
Grate firing	No			
Other – please specify in the 'Comment' cell	No			
NA				
BAT FOR DUST PREVENTION AND CONTROL IN COAL AND LIGNITE FIRED COMBUSTION PLANTS				
The use of **Electrostatic precipitator (ESP)** for de-dusting off-gases from coal- and lignite-fired new and existing combustion plants	Yes		(BREF for LCPs (July 2006); Chapter 4.5.6)	
The use of a **Fabric Filter (FF)** for de-dusting off-gases from coal- and lignite-fired new and existing combustion plants	No		(BREF for LCPs (July 2006); Chapter 4.5.6)	
For Pulverised Combustion (**PC**): Electrostatic Precipitator (**ESP**) or Fabric Filter (**FF**) in combination with wet flue gas desulphurisation **FGD (wet)**, flue gas desulphurisation by using a spray dryer **FGD (semi)** or flue gas desulphurisation by dry sorbent injection **FGD (dsi)**	Yes	Luigi system	(BREF for LCPs (July 2006); Chapter 4.5.6)	
Dust Continuous Monitoring	Yes	Port of Continuous Emissions Monitor (CEMS)	(BREF for LCPs (July 2006); Chapter 4.5.6)	

BAT FOR THE PREVENTION AND CONTROL OF SULPHUR DIOXIDE FROM COAL- AND LIGNITE-FIRED COMBUSTION PLANTS (SO_2)

BAT Description/ BREF reference	Answer (Y/N)	Comment	BREF	Note:
The use of low sulphur fuel as a supplementary technique to flue gas desulphurisation, to reduce SO_2 emissions (particularly for plants over 100 MW_{th}).	Yes	Sulphur content in fuel is controlled to ensure emission standards are met	(BREF for LCPs (July 2006); Chapter 4.5.8)	
For combustion plants less than 100 MW_{th}: the use of low sulphur coal.	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
For combustion plants less than 100 MW_{th}: the use of sorbent injection.	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
SO_2 (and dust): For pulverised coal- and lignite-fired and bubbling fluidised bed combustion boilers: the use of wet scrubbers (for combustion plants with a capacity of more than 100 MWth).	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
For pulverised coal- and lignite-fired and bubbling fluidised bed combustion boilers: the use of spray dry scrubbers.	Yes		(BREF for LCPs (July 2006); Chapter 4.5.8)	
For smaller applications below approximately 250 MW_{th}: dry sorbent injection (i.e. dry flue gas desulphurisation with an adjacent fabric filter).	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
The use of seawater scrubber	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
Combined techniques for the reduction of NO_x and SO_2 (where site-specific conditions allow these techniques to be used or justify the investment).	No	Separate SCR DeNOx upstream of desulphurisation	(BREF for LCPs (July 2006); Chapter 4.5.8)	
Sulphur capture in circulating fluidised bed combustion and pressurised fluidised bed combustion boilers with only limestone injection in the bed, low or moderate sulphur (<1 – 3 % S) fuels.	No		(BREF for LCPs (July 2006); Chapter 4.5.8)	
SO_2 Continuous Monitoring	Yes	Port of Continuous Emissions Monitor (CEMS)	(BREF for LCPs (July 2006); Chapter 4.5.8)	

BAT FOR NITROGEN OXIDE PREVENTION AND CONTROL IN COAL- AND LIGNITE-FIRED COMBUSTION PLANTS (NO_x)

BAT description/BREF reference	Answer (Y/N)	Comment	BREF	Note:
Reduction of nitrogen oxides (NO_x) by using a combination of primary measures (air and fuel-staging, and other) and/or secondary measures.	Yes		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For pulverised coal combustion (**PC**) plants: the use of primary measures in combination with secondary measures such as selective catalytic reduction of NO_x where the separation efficiency of the selective catalytic reduction system ranges between 80 and 95 %.	Yes	Luigi system SCR and low NOx burners	(BREF for LCPs (July 2006); Chapter 4.5.9)	
Combined techniques for the reduction of NO_x and SO_2 (where site-specific conditions allow these techniques to be used or justify the investment).	No	Separate SCR DeNOx upstream of desulphurisation	(BREF for LCPs (July 2006); Chapter 4.5.9)	
For pulverised lignite-fired combustion plants: the use of advanced low NO_x burners in combination with other primary measures such as flue gas recirculation, staged combustion (air staging), re-burning, and other.	Yes		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For older existing boilers: the application of modern swirl burners, which have flames not much longer than those in the original burners.	No		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For new installations: integration of low NO_x combustion into the boiler design.	No		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For small plants without high load variations and with a stable fuel quality: the selective non catalytic reduction of NO_x technique as an additional measure to further reduce NO_x emissions.	No		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For the fluidised bed combustion of coal and lignite: combination of primary measures such as air and fuel staging (if necessary together with selective non catalytic reduction for combustion plants with a capacity of more than 100 MW_{th}).	No		(BREF for LCPs (July 2006); Chapter 4.5.9)	
For the fluidised bed combustion of coal and lignite: a proper design fluidised bed to keep the NO_x formation below the levels achieved by low NO_x burners.	No		(BREF for LCPs (July 2006; Chapter 4.5.9)	
NOx Continuous Monitoring	No	Port of Continuous Emissions Monitor (CEMS)	(BREF for LCPs (July 2006); Chapter 4.5.9)	

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BIOMASS AND PEAT FIRED COMBUSTION PLANTS

BAT description/BREF reference	Answer (Y/N)	Comment	BREF	Note:
BAT FOR FUEL PRE-TREATMENT IN BIOMASS AND PEAT FIRED COMBUSTION PLANTS				
For the pre-treatment of biomass, in particular for wood: classification based on the size and the contamination of the wood	No	Not applicable - no biomass firing	(BREF for LCPs (July 2006); Chapter 5.5.2)	
In case the wood used is contaminated: it is BAT to know the type of contamination of the wood and an analytical knowledge of the contaminants for each load that arrives to the power plant.	No		(BREF for LCPs (July 2006); Chapter 5.5.2)	
BAT FOR COMBUSTION IN BIOMASS AND PEAT FIRED COMBUSTION PLANTS				
For the combustion of biomass and peat, pulverised combustion, fluidised bed combustion, as well as the spreader stoker grate-firing technique for wood and the vibrating, water-cooled grate for straw-firing are considered to be BAT. **Select the techniques applied in your process from the following list (rows from 75 to 80)**			(BREF for LCPs (July 2006); Chapter 5.5.3)	
Pulverised combustion **(PC)**	No			
Bubbling fluidised bed combustion **(BFBC)**	No			
Circulating fluidised bed combustion **(CFBC)**	No			
Spreader stoker grate-firing technique for wood	No			
Vibrating, water-cooled grate for straw-firing	No			
Other – please specify in the 'Comment cell'	No			
The use of advanced computerised control system in order to achieve a high boiler performance with increased combustion conditions that support the reduction of emissions.	No		(BREF for LCPs (July 2006); Chapter 5.5.3)	
For grate-firing systems for biomass: spreader-stoker travelling (the resulting nitrogen oxide (NO_x >200 mg/Nm³) and carbon monoxide emissions are usually low).	No		(BREF for LCPs (July 2006); Chapter 5.5.3)	
For straw firing using the vibrating water-cooled grates: steam temperatures below approximately 500 °C in order to avoid corrosion.	No		(BREF for LCPs (July 2006); Chapter 5.5.3)	
BAT FOR DUST PREVENTION AND CONTROL IN BIOMASS AND PEAT FIRED COMBUSTION PLANTS				
The use of bag-houses with fabric filters.	No		(BREF for LCPs (July 2006); Chapter 5.5.5)	
The use of electrostatic precipitator (ESP).	No		(BREF for LCPs (July 2006); Chapter 5.5.5)	
Cyclones and mechanical collectors as a pre-cleaning stage in the flue gas path.	No		(BREF for LCPs (July 2006); Chapter 5.5.5)	
Continuous Dust monitoring			(BREF for LCPs (July 2006); Chapter 5.5.5)	

BAT FOR THE PREVENTION AND CONTROL OF SULPHUR DIOXIDE IN BIOMASS AND PEAT FIRED COMBUSTION PLANTS (SO_2)

For the combustion of peat with higher sulphur content or with the co-firing of biomass/peat with other fuels, e.g. coal: reduction of SO_2 by primary measures and/or secondary measures (dependins on the fuel mixture).	No	Not applicable - no biomass firing	(BREF for LCPs (July 2006); Chapter 5.5.7)	(please see 'Glossary' for the meaning of 'primary measures' and 'secondary measures')
For new smaller LCP boilers (<100 MWth) with fluidised bed combustion: dry injection processes (in situ desulphurisation by adding limestone or dolomite to the bed).	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
Calcium hydroxide injection in the dry form before the fabric filter or electrostatic precipitator.	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
For pulverised combustion (>300 MW_{th}): Seawater scrubbing.	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
For pulverised combustion (>300 MW_{th}): wet flue gas desulphurisation.	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
For pulverised combustion (>300 MW_{th}): combined techniques for the reduction of NO_x and SO_2.	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
In the furnace, limestone injection together with a calcium oxide activation scrubber.	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
For circulating fluidised bed combustion with high desulphurisation (>80 %): combination of sorbent injection into the furnace solution the use of a secondary measure	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	(please see 'Glossary' for the meaning of 'secondary measures')
SO_2 and CO:				
For fluidised bed combustion: co-combustion of peat and different types of wood biomass (coarsley, wood chips, bark, and other)	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	
SO_2 MONITORING				
Continuous SO_2 monitoring	No		(BREF for LCPs (July 2006); Chapter 5.5.7)	

BAT FOR NITROGEN OXIDE PREVENTION AND CONTROL IN BIOMASS AND PEAT FIRED COMBUSTION PLANTS (NO_x)

Reduction of nitrogen oxides (NO_x) using a combination of primary and/or secondary measures (e.g. selective non catalytic reduction of NO_x and selective catalytic reduction of NO_x).	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	(please see 'Glossary' for the meaning of 'primary measures' and 'secondary measures')
For the grate-firing of biomass, in particular wood-based biomass: spreader-stoker technique (combustion on an air-cooled travelling grate stoker)	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	
For pulverised peat-fired combustion plants: the combination of different primary measures, for instance, the use of advanced low NO_x burners in combination with other primary measures such as flue gas recirculation, staged combustion (air staging), and re-burning, and other	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	(please see 'Glossary' for the meaning of 'primary measures')
For fluidised bed combustion boilers burning biomass or peat: reduction of NO_x emissions achieved by air distribution or by flue gas recirculation	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	
Selective non-catalytic reduction by feeding ammonia or urea to the furnace.	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	
To avoid ammonia slip with the selective non-catalytic reduction technique, installation of a low layer of selective catalytic reduction catalyst in the economiser area of the boiler	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	
NO_x MONITORING				
Continuous NO_x monitoring	No		(BREF for LCPs (July 2006); Chapter 5.5.8)	

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BEST AVAILABLE TECHNIQUES (BAT) FOR THE COMBUSTION PLANTS FIRING LIQUID FUELS

BAT FOR STORAGE AND HANDLING OF LIQUIDS AND LIQUEFIED GASES

BAT description/BREF reference	Answer (Y/N)	Comment - Description of the technique applied	Bref	Note:
For a proper tank design at least the following shall be taken into account:			(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
The physico-chemical properties of the substance being stored;	Yes		(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
How the storage is operated, what level of instrumentation is needed, how many workers are required, and what their workload will be;	Yes		(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
How the workers are informed about deviations from normal process conditions (alarms);	Yes	Linked to site process control system	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
How the storage is protected against deviations from normal process conditions (safety instructions, interlock systems, pressure relief devices, leak detection and containment, and other);	Yes	Level control, temperature control	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
What equipment has to be installed, largely taking account of past experiences of the product (construction materials, valve quality, and other);	Yes		(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
Which maintenance and inspection plan needs to be implemented and how to ease the maintenance and inspection work (access, layout, and other);	Yes	Inspection plan for storage tank integrity	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
How to deal with emergency situations (distances to other tanks, facilities and to the boundary, fire protection, access for emergency services such as the fire brigade, and other)	Yes	Design of tank farm includes recognised separation distances to prevent fire spread	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
Other – please specify in the 'Comment' cell	Yes	Fire water retention study to be completed	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
NA				
Appliance of a tool to determine proactive maintenance plans and to develop risk-based inspection plans such as the risk and reliability based maintenance approach.	Yes	Inspection intervals for storage tanks are risk based	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
Location and layout				
Locate a tank operating at, or close to, atmospheric pressure aboveground. For storing flammable liquids on a site with restricted space, underground tanks can also be considered.	Yes	Overground atmospheric storage for HFO	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
Abatement of emissions from tank storage, transfer and handling that have a significant negative environmental effect.	No	HFO has very low vapour pressure and does not require abatement	(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	

BAT FOR PRE-TREATMENT OF LIQUID FUELS USED IN ENGINES AND GAS TURBINES

BAT description/BREF reference	Answer (Y/N)	Comment - Description of the technique applied	Bref	Note:
For diesel oil used as a fuel in gas turbines and engines: the use of fuel pre-treatment plants, which comprise diesel oil cleaning units of the centrifuge self-cleaning type or of the electrostatic type.	No		(BREF for LCPs (July 2006); Chapter 6.5.2)	
For heavy fuel oil firing: the fuel treatment plant comprises heaters for heating the heavy fuel oil (electrical or steam coil type); de-emulsifier dosing systems, for breaking up the oil emulsion; separators (centrifugal or electrostatic type), for removing the solid impurities; and additive dosing systems, for raising the melting point of the vanadium oxidation products.	Yes	HFO heating system	(BREF for LCPs (July 2006); Chapter 6.5.2)	

BAT FOR LIQUID FUEL-FIRED BOILERS

BAT FOR DE-DUSTING OF WASTE GASES FROM LIQUID FUEL FIRED BOILERS (DUST)

The use of electrostatic precipitator.	Yes	Same control technology as in previous section for coal	(BREF for LCPs (July 2006); Chapter 6.5.3.2)	
The use of fabric filter.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.2)	
The use of cyclones and mechanical collectors as a pre-cleaning stage in the flue gas path.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.2)	
The use of wet scrubber in combination with electrostatic precipitator/fabric filter (>100 MW_{th}).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.2)	
DUST MONITORING				
Continuous Dust monitoring Periodic monitoring: for heavy metals (every year up to every third year, depending on the kind of liquid fuel used is recommended).	Yes		(BREF for LCPs (July 2006); Chapter 6.5.3.2)	

BAT FOR THE PREVENTION AND CONTROL OF SULPHUR DIOXIDE IN LIQUID FUEL FIRED BOILERS (SO_2)

The use of low sulphur fuel oil and/or desulphurisation (<100 MW_{th}).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
The use of low sulphur fuel oil for combustion plants over 100 MW_{th} as a supplementary technique to reduce SO_2.	Yes	Heavy fuel oil specification is < 1%	(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
In sites where natural gas is available: co-combustion of gas and oil.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
For combustion plants over 100 MW_{th}: the use of the wet scrubber (further reduction of the SO_2 emissions by optimising the flow pattern in the absorber vessel).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
The use of the spray dry scrubber.	Yes	Same control technology as in previous section for coal	(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
The use of dry sorbent injection for plants less the 300 MW_{th}.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
The use of seawater scrubber (>100 MW_{th}).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
Combined techniques for the reduction of NO_x and SO_2 (>100 MW_{th}).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.3)	
SO_x MONITORING				
Continuous	Yes	As previous, CEMs system	(BREF for LCPs (July 2006); Chapter 6.5.3.3)	

BAT FOR NITROGEN OXIDE PREVENTION AND CONTROL IN LIQUID FUEL FIRED BOILERS (NO_x)

Reduction of nitrogen oxides (NO_x) using a combination of primary measures (such as air and fuel staging, low-NO_x burner, and other) and/or secondary measures in particular for large plants over 100 MW_{th} (e.g. selective catalytic reduction of NO_x or other end-of-pipe techniques).	Yes	Same control technology as in previous section for coal	(BREF for LCPs (July 2006); Chapter 6.5.3.4)	(please see 'Glossary' for the meaning of 'primary measures' and 'secondary measures')
For heavy fuel oil firing (<100 MWth): the use of selective non catalytic reduction of NO_x.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.4)	
For combustion plants below 100 MW_{th}: the use of a combination of different low NO_x.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.4)	(please see 'Glossary' for the meaning of 'primary measures')
Combined techniques for the reduction of NO_x and SO_2 (applicability to be check case by case according to local level conditions).	No		(BREF for LCPs (July 2006); Chapter 6.5.3.4)	
For new combustion plants: low NO_x combustion integration into the boiler design.	No		(BREF for LCPs (July 2006); Chapter 6.5.3.4)	
NO_x MONITORING				
Continuous	Yes		(BREF for LCPs (July 2006); Chapter 6.5.3.4)	

BEST AVAILABLE TECHNIQUES (BAT) FOR LIQUID FUEL-FIRED GAS TURBINES

BAT FOR THE PREVENTION AND CONTROL OF SULPHUR DIOXIDE AND NITROGEN OXIDE IN LIQUID FUEL FIRED GAS TURBINES (SO_2 and NO_x)

NO_x				
For gas turbines firing liquid fuel such as light fuel oil or diesel: the injection of water or steam is for the reduction of NO_x emissions.	No		(BREF for LCPs (July 2006); Chapter 6.5.4)	
Dry low NO_x premix burners (DLN) are BAT only for new turbines were the technique is available on the market for the use in gas turbines burning liquid fuels.	No		(BREF for LCPs (July 2006); Chapter 6.5.4)	
Selective catalytic reduction: according to the economic feasibility the application needs to be regarded case by case. For gas turbines using only liquid fuel (for instance, in cases where gaseous fuels are temporarily not available).	No		(BREF for LCPs (July 2006); Chapter 6.5.4)	
SO_x				
The use of low sulphur fuel oil for the reduction of SO_2.	No		(BREF for LCPs (July 2006); Chapter 6.5.4)	

BEST AVAILABLE TECHNIQUES (BAT) FOR LIQUID FUEL-FIRED (DIESEL) ENGINES

BAT FOR DE-DUSTING OF WASTE GASES FROM LIQUID FUEL FIRED ENGINE PLANTS (DUST)

BAT description/BREF reference	Answer (Y/N)	Comment	Bref	Note:
For larger diesel engines: the use of engine measures in combination with the use of a low ash and low sulphur fuel, whenever commercially available	No		(BREF for LCPs (July 2006); Chapter 6.5.5.2)	(secondary cleaning devices for the reduction of particulate emissions is under development at the moment).
For large capacity plants consisting of a number of several aggregates with comparatively small capacities: each individual aggregate can be equipped with filters for particles especially soot. Dust emissions from engines of up to 1.3 MW fuel input can be reduced below emission values of 20 mg/Nm^3.	No		(BREF for LCPs (July 2006); Chapter 6.5.5.2)	
Very small reduction in particulate matter may be achieved by using and selective catalytic reduction for NO_x reduction, depending on the fuel type and exhaust temperature.	No		(BREF for LCPs (July 2006); Chapter 6.5.5.2)	

BAT FOR THE PREVENTION AND CONTROL OF SULPHUR DIOXIDE IN LIQUID FUEL FIRED ENGINE PLANTS (SO_2)

The use of low sulphur fuel oil or natural gas, whenever commercially available.	No		(BREF for LCPs (July 2006); Chapter 6.5.5.3)	
If low sulphur fuel oil or natural gas are not available, the use of a secondary flue gas desulphurisation system.	No		(BREF for LCPs (July 2006); Chapter 6.5.5.3)	

BAT FOR NITROGEN OXIDE PREVENTION AND CONTROL IN LIQUID FUEL FIRED ENGINE PLANTS (NO_x)

Reduction of nitrogen oxides (NO_x) from liquid-fuel-fired engine plants using a combination of primary measures and/or secondary measures (in particular the application of a selective catalytic reduction[37] of NO_x).			(BREF for LCPs (July 2006); Chapter 6.5.5.4)	(please see 'Glossary' for the meaning of 'primary measures' and 'secondary measures')
The 'Miller concept'	No		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	(please see 'Glossary' for the meaning of 'primary measures' and 'secondary measures')
Injection retard	No		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
Direct water injection **(DWI)**	No		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
Humid air injection **(HAM)**	No		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
Application of a selective catalytic reduction of **NO_x**	No		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
NA	Yes		(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
NO_x MONITORING			(BREF for LCPs (July 2006); Chapter 6.5.5.4)	
Continuous **NO_x** monitoring			(BREF for LCPs (July 2006); Chapter 6.5.5.4)	

[37] A limitation for the applicability of selective catalytic reduction is given for small diesel and two stroke engines which needs to be operated with often varying loads. Selective catalytic reduction is an applied technique for diesel engines, but cannot be seen as BAT for engines with frequent load variation, including frequent start up and shut down periods due to technical constraints.

Back t	BEST AVAILABLE TECHNIQUES (BAT) FOR THE COMBUSTION OF GASEOUS FUELS				
	BAT FOR DE-DUSTING OF WASTE GASES AND PREVENTION AND CONTROL OF SULPHUR DIOXIDE FROM THE COMBUSTION OF GASEOUS FUELS (DUST and SO_2)				
	For gas-fired combustion plants using natural gas as a fuel, emissions of dust and SO_2 are very low. The emission levels of dust by using natural gas as a fuel are normally well below 5 mg/Nm^3 and SO_2 emissions are well below 10 mg/Nm3 (15% O_2), without any additional technical measures being applied.	No	Gaseous fuel not used so this section is not applicable	(BREF for LCPs (July 2006); Chapter 7.5.3)	
	If other industrial gases are used as a fuel such as refinery gas or blast furnace gas, pre-treatment gas cleaning measures (such as fabric filters) needs to be applied in order to reduce the dust content and the amount of SO_2 in the flue-gas, which may otherwise damage the gas turbines or engines.			(BREF for LCPs (July 2006); Chapter 7.5.3)	
	Limitation of the H_2S content of the refinery gas to 20 – 150 mg/Nm^3 (leading to an emission of 5 – 20 mg/Nm^3 of SO_2). Such gases do not create particulate emissions.			(BREF for LCPs (July 2006); Chapter 7.5.3)	
	BAT FOR THE REDUCTION OF NO_x EMISSIONS FROM SOME GAS FIRED COMBUSTION PLANTS (NO_x)				
	For new gas turbines: the use of dry low NO_x premix burners **(DLN)**.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For existing gas turbines: the majority of existing gas turbines can be converted to the dry low NO_x premix burner **(DLN)** technique (to be decided case by case).			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For existing gas turbines: the use of water and steam injection.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	The use of selective catalytic reduction[40] (For new gas turbines, the dry low NO_x premix burners can be seen as the standard technique so that the application of an additional selective catalytic reduction system is, in general, not necessary).			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For new gas turbines: however, for further reduction of NO_x, selective catalytic reduction can be considered where local air quality standards request a further reduction of NO_x emissions.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For new gas-fired stationary engine plants: the use of lean-burn approach (an inbuilt method, no extra reagents or water need to be supplied to the site for NO_x reduction) analogous to the dry low NO_x technique used in gas turbines.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For gas-fired stationary engine plant: gas engines equipped with a selective catalytic reduction technique.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For new and existing gas-fired boilers: the use of low-NO_x burners, or selective catalytic reduction, or selective non-catalytic reduction.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For new combined cycle gas turbines without supplementary firing (heat recovery steam generator): the use of dry low-NO_x premix burners or selective catalytic reduction.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For new combined cycle gas turbines with supplementary firing: the use of dry low-NO_x premix burners and low-NO_x burners for the boiler part, or selective catalytic reduction, or selective non-catalytic reduction.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For existing combined cycle gas turbines without supplementary firing (heat recovery steam generator): the use of dry low-NO_x premix burners, or water and steam injection, or selective catalytic reduction if the required space has already been foreseen in the heat recovery steam generator.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	For existing combined cycle gas turbines with supplementary firing: the use of dry low-NO_x premix burners, or water and steam injection and low-NO_x burners for the boiler part, or selective catalytic reduction if the required space has already been foreseen in the heat recovery steam generator, or selective non-catalytic reduction.			(BREF for LCPs (July 2006); Chapter 7.5.4)	
	NO_x MONITORING				
	Continuous NO_x monitoring			(BREF for LCPs (July 2006); Chapter 7.5.4)	

[40] Selective catalytic reduction retrofitting is technically feasible, but not economical for existing combined cycle gas turbine plants if the required space in the heat recovery steam generator was not foreseen in the project and is therefore not available.

Back t	BEST AVAILABLE TECHNIQUES (BAT) SPECIFIC FOR THE ENERGY SYSTEMS OF MINERAL OIL AND GAS REFINERIES				
	BAT FOR PREVENTION AND CONTROL OF SULPHUR DIOXIDE AND NITROGEN OXIDE, AND DE-DUSTING OF WASTE GASES IN THE ENERGY SYSTEMS OF MINERAL OIL AND GAS REFINERIES (SO_2, NO_x and DUST)				
	BAT description/BREF reference	Answer (Y/N)	Comment - Description of the technique applied	Bref	Note:
	Quantification of dust, SO_2 and NO_x emissions from various refinery sources to identify the main emitters in each specific case.	No	Refinery BAT not applicable to this installation	(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.1)	
	Primary measure: the use of clean refinery fuel gas and, if necessary, supply of the rest of the refinery energy demand.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	(please see 'Glossary' for the meaning of 'primary measures')
	The use of liquid fuel combined with control and abatement techniques or other fuel gases such as natural gas or liquefied petroleum gas.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	SO_2			(BREF on Emissions from Storage (July 2006); Chapter 5.1.1.1)	
	Maximisation of the use of refinery fuel gas with low H_2S content.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	Balance and control of the refinery flue gas system between suitable pressure limits to give system flexibility, with make-up available from sulphur-free sources such as liquefied petroleum gas or imported gas.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	Increase proportion of use of clean fuels (to low-sulphur residual fuel, to gasoil, ultimately to gas)			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	Hydrodesulphurisation of the necessary amount of liquid fuel.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	NO_x				
	Primary measure: reduction of fuel consumption.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	(please see 'Glossary' for the meaning of 'primary measures')
	High thermal efficiency heater/boiler designs with good control systems.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	Flue gas circulation in boilers.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	External flue gas recirculation to increase the diluent effect, hence to reduce combustion temperature.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	
	DUST				
	Primary measure: maximising the use of gas and low ash content liquid fuels.			(BREF for Mineral Oil and Gas Refineries (February 2003); Chapter 5.2, Point 10)	(please see 'Glossary' for the meaning of 'primary measures')