

Inspection Report

Report No.	: EIL-IR-2021/574
Client's Identity	: The Rose Dresses Ltd., Islam Garments Ltd. and Islam Dresses Ltd.
Client's Address	: Jamgora, Ashulia, Savar, Dhaka
Date of Inspection	: 17-01-2021 & 18-01-2021
Inspection Time	: 09:00 AM - 6:00 PM
Report Issue date	: 26-01-2021
Identification of Inspection	: Point Source/ Stack Air Emission & GHG Inventory

Inspection summary

Sl. No.	Inspection Item	Requirement	Equipment	Methods	Comment
1	Stack Air Emission	ECR 1997 Standards, Oeko-Tex and World Bank 2006 –IFC Standard	Flue Gas Analyzer (Testo340), Stack Sampler (VSS1)	In house (EIL-IMP-04, EIL-IMP-15)	See the Result
2	Green House Gas (GHGs) Inventory	-----	-----	Green House Gas Protocol	See the Result

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Inspection Team:

1. Md. Shah Alam Khan

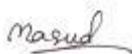
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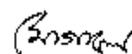
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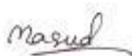
Stack Air Emission

Stack emissions are those gases and solids that come out of the smoke stack after the incineration process. Incinerators can be designed to accept wastes of any physical form, including gases, liquids, solids, sludges, and slurries. Incineration is primarily for the treatment of wastes that contain organic compounds. Wastes with a wide range of chemical and physical characteristics are considered suitable for burning. Most of these wastes are by-products of industrial manufacturing and chemical production processes, or result from the clean-up of contaminated sites.

There is a great deal of controversy about the content of incinerator stack emissions. The Environmental Protection Agency (EPA) supports incineration as a waste management tool and claims that these emissions are not dangerous. In an official publication, the EPA has stated: "Incinerator emission gases are composed primarily of two harmless inorganic compounds, carbon dioxide and water. The type and quantity of other compounds depends on the composition of the wastes, the completeness of the combustion process, and the air pollution control equipment with which the incinerator is equipped. These compounds include organic and inorganic compounds contained in the original waste and organic and inorganic compounds created during combustion."

Contrary to the EPA, many environmentalists believe that burning hazardous waste, even in "state-of-the-art" incinerators, releases far more heavy metals, unburned wastes, dioxins, and new chemicals formed during the incineration process (PICs) than is healthy for the environment or humans. In a report published in 1990, *Playing with Fire*, Greenpeace disagrees strongly about the toxic materials emitted from incinerator stacks.

The report argues that metals are not destroyed during incineration; in fact, they are often released in forms that are far more dangerous than the original wastes. At least 19 metals have been identified in the air emissions of hazardous waste incinerators. An average-sized commercial incinerator burning hazardous waste with average metals content emits these metals into the air at



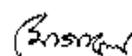
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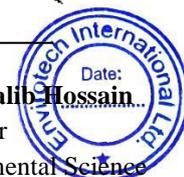
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the rate of 204 lb (92.6 kg) per year and deposits another 670,000 lb (304,180 kg) of metals per year in its residual ashes and liquids, which must be properly disposed of in landfills designed for that purpose.

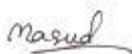
Stack Effect in Flue Stack and Chimneys

The stack effect in industrial flue gas stacks is similar to that in buildings, except that it involves hot flue gases having large temperature differences with the ambient outside air. Furthermore, an industrial flue gas stack typically provides little obstruction for the flue gas along its length and is, in fact, normally optimized to enhance the stack effect to reduce fan energy requirements.

Large temperature differences between the outside air and the flue gases can create a strong stack effect in chimneys for buildings using a fireplace for heating.

Before the development of large volume fans, mines were ventilated using the stack effect. A downcast shaft allowed air into the mine. At the foot of the up cast shaft a furnace was kept continuously burning. The shaft behaved like a chimney and air rose through it drawing fresh air down the downcast stack and around the mine.

The combustion flue gases inside the flue gas stacks are much hotter than the ambient outside air and therefore less dense than the ambient air. That causes the bottom of the vertical column of hot flue gas to have a lower pressure than the pressure at the bottom of a corresponding column of outside air. That higher pressure outside the chimney is the driving force that moves the required combustion air into the combustion zone and also moves the flue gas up and out of the chimney. That movement or flow of combustion air and flue gas is called "natural draft", "natural ventilation", "chimney effect", or "stack effect".



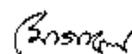
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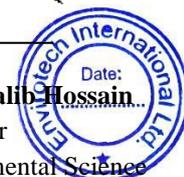
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Stack Air Emission Monitoring Report (Generator and Boiler)

The Stack Air Emission is monitored by automatic sampler connected with the analyzer. The machine probe has set to the center point of the exhaust. Sampling has been conducted for specific time intervals mentioned in the work instruction and recorded in a field data collection sheet. Envirotech International Ltd. Director/ Technical Manager, Md. Masud – Un – Noby has collected the monitoring data. The entire monitoring process has been conducted following Envirotech International Ltd. Equipment Operating Guideline (EIL-EOG-04, EIL-EOG-15) and standard operating procedure (EIL-EOG -04, EIL-EOG-15).

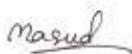
Sampling Description

Name of Combustion Unit : Generator- 1

Fuel Type : Natural Gas

Key Information Generator (No.- 1)	
Location	Gas Generator Room (Ground Floor)
Capacity	1875 KVA/1500 KW
Supplier Name	Cultimax
Origin	Germany
Model/Brand	TCG 2020 V16K/MWM
Installation Date	2015
Volt	400/230V
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2688 hours
Total Fuel Consumption (last one year)	575590 m ³

Relevant Weather Conditions During the Test Period	
Temperature Level	33.1°C
Humidity Level	59.9%
Ambient Weather	Sun Shined
Flue Pressure	0.643456 Mpa
Flue Temperature (°C)	425.5°C
Excess Air (%)	14.02%



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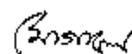


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Inspection Result of Stack Air Emission (Generator-1)

Standard Permissible Limit for Generator	Obtained value						
	O ₂ %	CO mg/Nm ³	NO mg/Nm ³	CO ₂ %	NO _x mg/Nm ³	SO ₂ mg/Nm ³	SPM mg/Nm ³
Obtained Value (Collected data)	2.57	42.2	20	6.92	28	0	41
ECR' 1997, Schedule 11, (mg/Nm ³ or as indicated)	NYS	NYS	30 ppm	NYS	30 ppm	NYS	350
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	15	NYS	NYS	NYS	<400	1.5-3.0	50-100
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

Graphical presentation of Stack Air Emission (Generator-1)

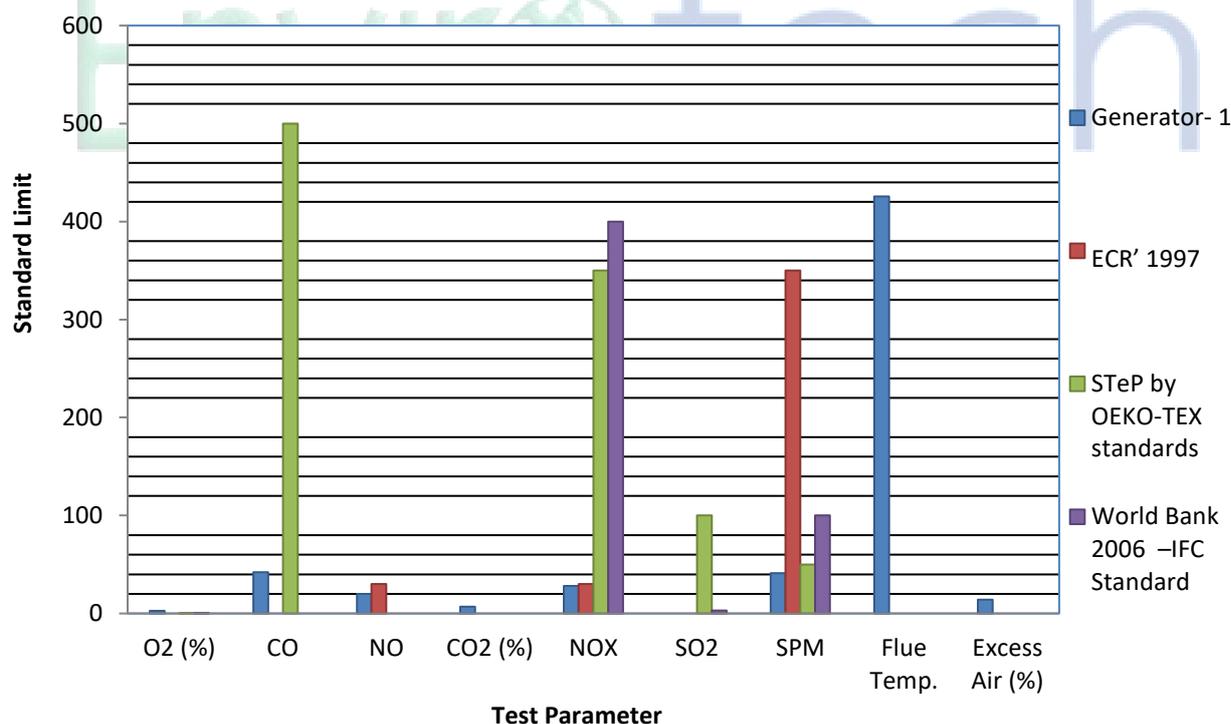


Figure: Graphical presentation of the stack Air emission Level

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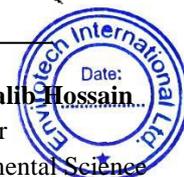
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Sampling Description

Name of Combustion Unit : Generator- 2

Fuel Type : Diesel

Key Information Generator (No.- 2)	
Location	Gas Generator Room (Ground Floor)
Capacity	550 KVA/440 KW
Supplier Name	Time Power
Origin	UK
Model/Brand	C550DSE/Cummins
Installation Date	2015
Volt	400/230V
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	116.84 hours
Total Fuel Consumption (last one year)	2696 Liter

Relevant Weather Conditions During the Test Period:

Temperature Level	33.2°C
Humidity Level	60.9%
Ambient Weather	Sun Shined
Flue Pressure	0.642356 Mpa
Flue Temperature (°C)	427.0°C
Excess Air (%)	12.60%

Inspection Result of Stack Air Emission (Generator-2)

Standard Permissible Limit for Generator	Obtained value						
	O ₂ %	CO mg/Nm ³	NO mg/Nm ³	CO ₂ %	NO _x mg/Nm ³	SO ₂ mg/Nm ³	SPM mg/Nm ³
Obtained Value (Collected data)	2.34	43.2	23	6.76	24	0	35
ECR' 1997, Schedule 11, (mg/Nm ³ or as indicated)	NYS	NYS	30 ppm	NYS	30 ppm	NYS	350
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	15	NYS	NYS	NYS	<400	1.5-3.0	50-100
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

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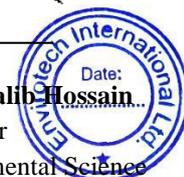
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Graphical presentation of Stack Air Emission (Generator-2)

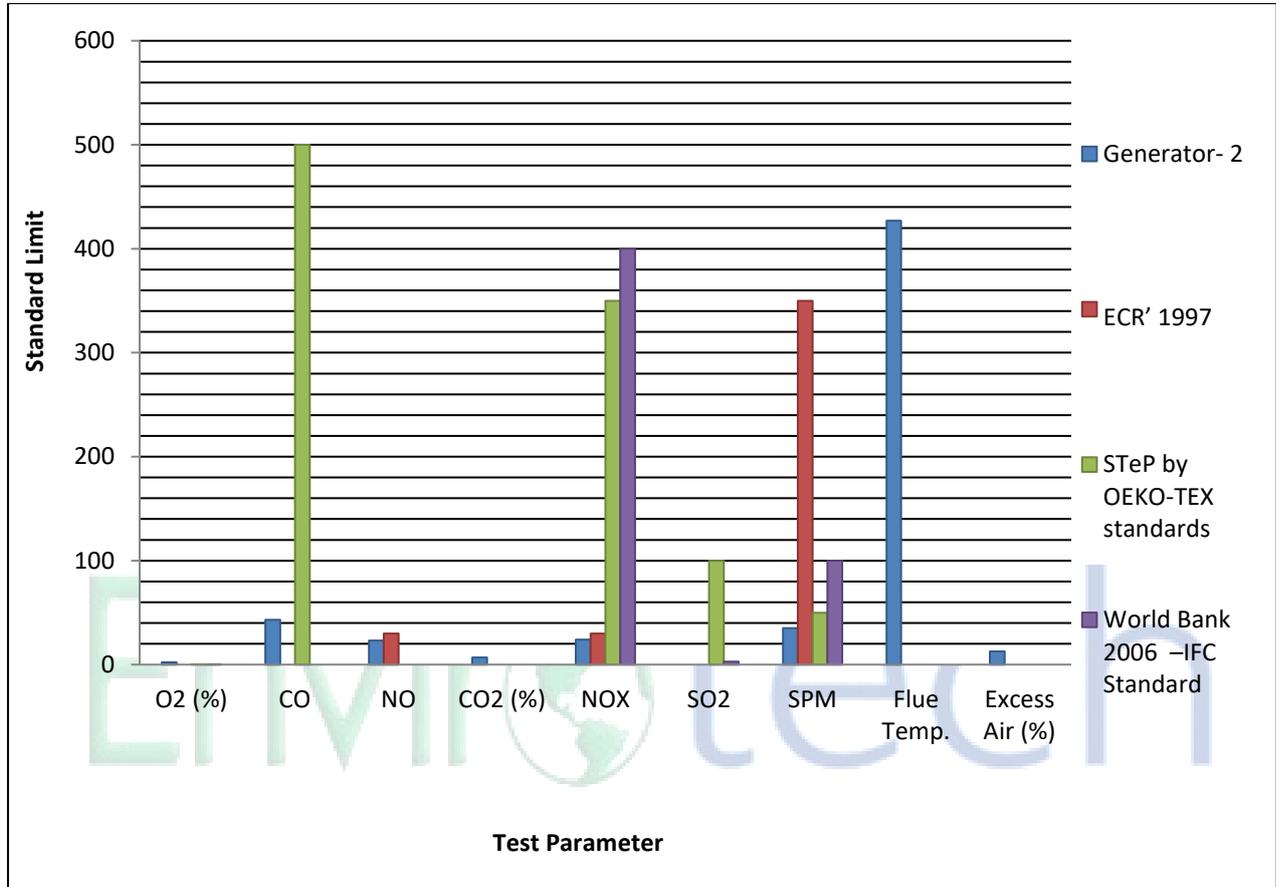


Figure: Graphical presentation of the stack Air emission Level

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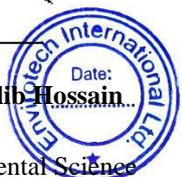
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Sampling Description

Name of Combustion Unit : Generator- 3

Fuel Type : Diesel

Key Information Generator (No.- 3)	
Location	Gas Generator Room (Ground Floor)
Capacity	600 KVA/480 KW
Supplier Name	Cross World
Origin	UK
Model/Brand	HCI544E1/Perkins
Installation Date	2015
Volt	400/230V
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	57.92 hours
Total Fuel Consumption (last one year)	1116 Liter

Relevant Weather Conditions During the Test Period:

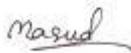
Temperature Level	33.2°C
Humidity Level	60.9%
Ambient Weather	Sun Shined
Flue Pressure	0.641256 Mpa
Flue Temperature (°C)	305.0°C
Excess Air (%)	12.97%

Inspection Result of Stack Air Emission (Generator-3)

Standard Permissible Limit for Generator	Obtained value						
	O ₂ %	CO mg/Nm ³	NO mg/Nm ³	CO ₂ %	NO _x mg/Nm ³	SO ₂ mg/Nm ³	SPM mg/Nm ³
Obtained Value (Collected data)	2.40	37.2	26	7.45	28	0	31
ECR' 1997, Schedule 11, (mg/Nm ³ or as indicated)	NYS	NYS	30 ppm	NYS	30 ppm	NYS	350
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	15	NYS	NYS	NYS	<400	1.5-3.0	50-100
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



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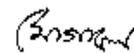


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Graphical presentation of Stack Air Emission (Generator-3)

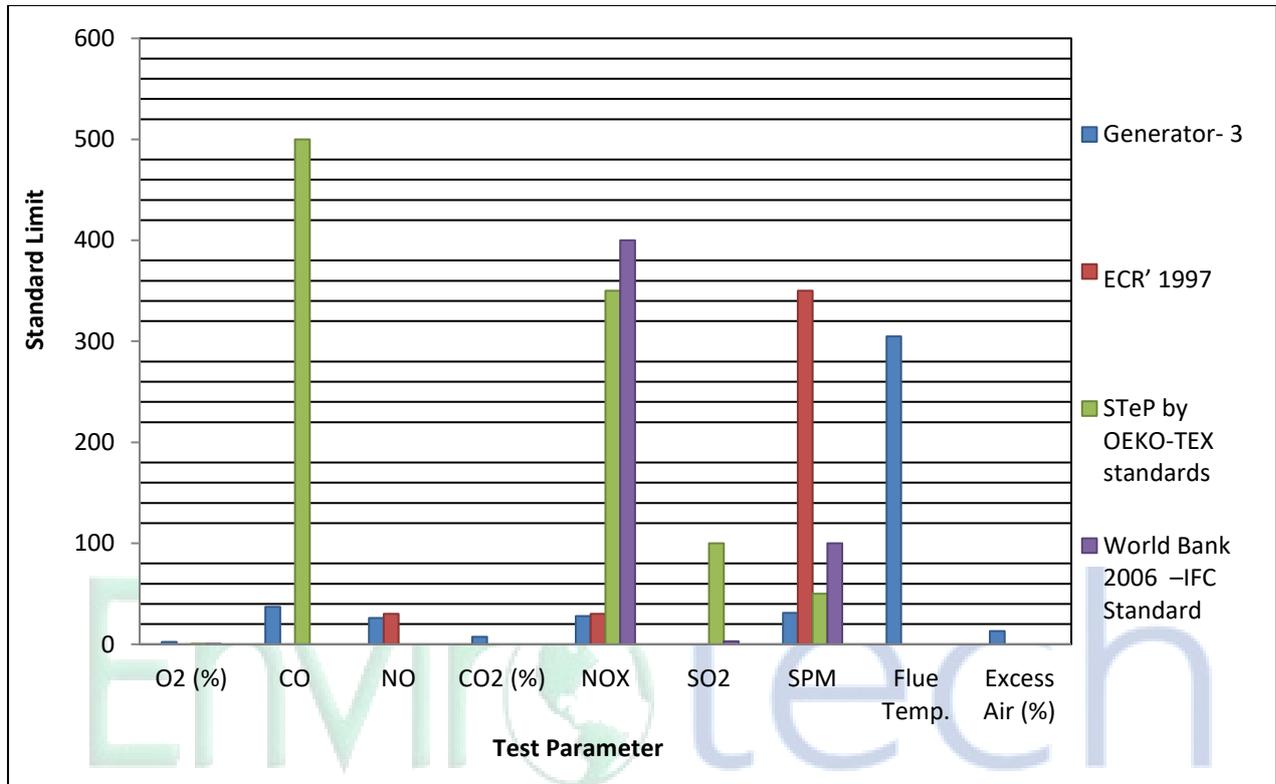


Figure: Graphical presentation of the stack Air emission Level

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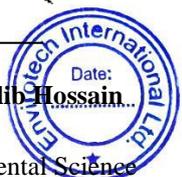
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Sampling Description

Name of Combustion Unit : Generator- 4

Fuel Type : Diesel

Key Information Generator (No.- 4)	
Location	Gas Generator Room (Ground Floor)
Capacity	400 KVA/320 KW
Supplier Name	Cross World
Origin	UK
Model/Brand	ECO38-3LN/Perkins
Installation Date	2018
Volt	400/230V
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	21.58 hours
Total Fuel Consumption (last one year)	100 Liter

Relevant Weather Conditions During the Test Period:

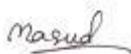
Temperature Level	33.1°C
Humidity Level	57.6%
Ambient Weather	Sun Shined
Flue Pressure	0.431456 Mpa
Flue Temperature (°C)	235.0°C
Excess Air (%)	12.48%

Inspection Result of Stack Air Emission (Generator-4)

Standard Permissible Limit for Generator	Obtained value						
	O ₂ %	CO mg/Nm ³	NO mg/Nm ³	CO ₂ %	NO _x mg/Nm ³	SO ₂ mg/Nm ³	SPM mg/Nm ³
Obtained Value (Collected data)	2.32	25.2	21	6.29	27	0	49
ECR' 1997, Schedule 11, (mg/Nm ³ or as indicated)	NYS	NYS	30 ppm	NYS	30 ppm	NYS	350
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	15	NYS	NYS	NYS	<400	1.5-3.0	50-100
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



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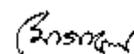


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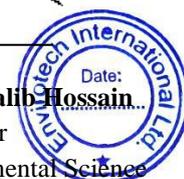


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Graphical presentation of Stack Air Emission (Generator-4)

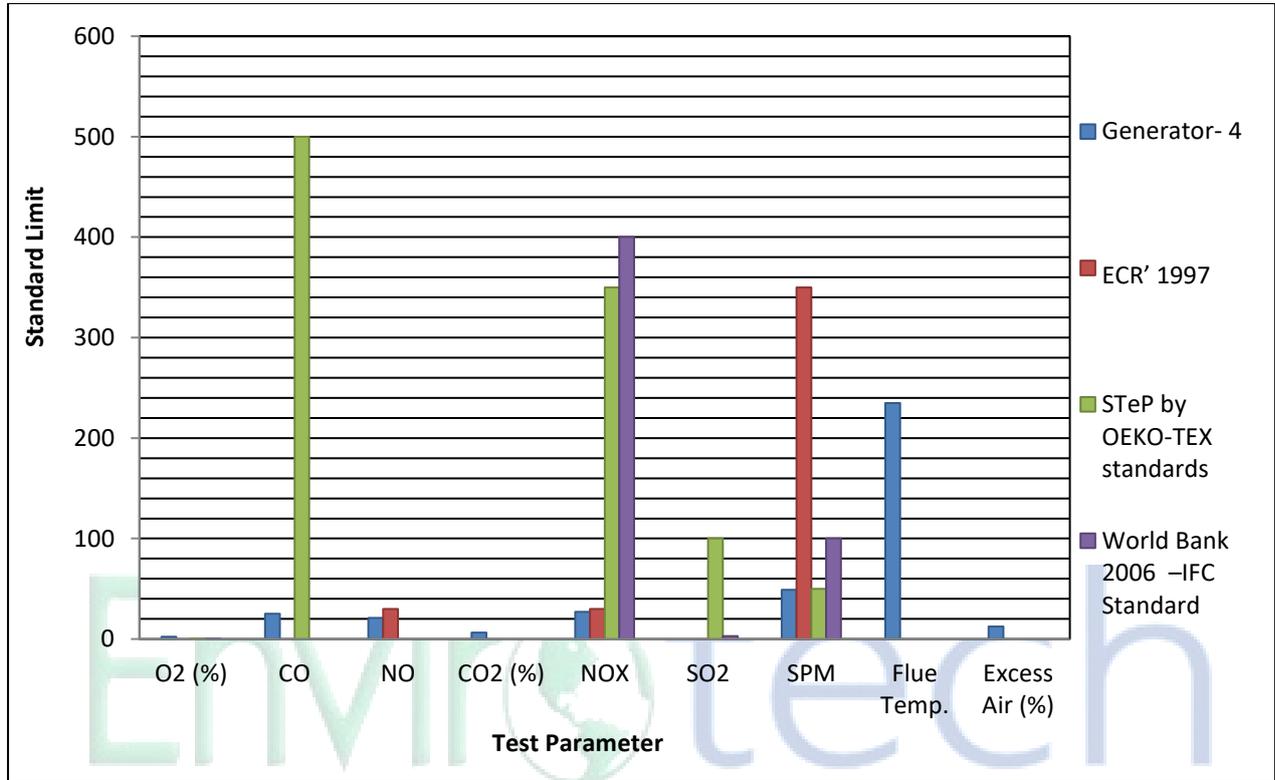


Figure: Graphical presentation of the stack Air emission Level

Masud

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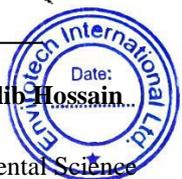
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Sampling Description

Name of Combustion Unit : Generator- 5

Fuel Type : Diesel

Key Information Generator (No.- 5)	
Location	Gas Generator Room (Ground Floor)
Capacity	125 KVA/100 KW
Origin	UK
Model/Brand	431PSL1264
Installation Date	2018
Volt	400/230V
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	1 hours

Relevant Weather Conditions During the Test Period:

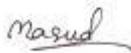
Temperature Level	33.4°C
Humidity Level	59.2%
Ambient Weather	Sun Shined
Flue Pressure	0.871456 Mpa
Flue Temperature (°C)	135.0°C
Excess Air (%)	14.14%

Inspection Result of Stack Air Emission (Generator-5)

Standard Permissible Limit for Generator	Obtained value						
	O ₂ %	CO mg/Nm ³	NO mg/Nm ³	CO ₂ %	NO _x mg/Nm ³	SO ₂ mg/Nm ³	SPM mg/Nm ³
Obtained Value (Collected data)	2.59	55.2	18	6.90	23	0	34
ECR' 1997, Schedule 11, (mg/Nm ³ or as indicated)	NYS	NYS	30 ppm	NYS	30 ppm	NYS	350
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	15	NYS	NYS	NYS	<400	1.5-3.0	50-100
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



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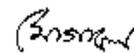


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Graphical presentation of Stack Air Emission (Generator-5)

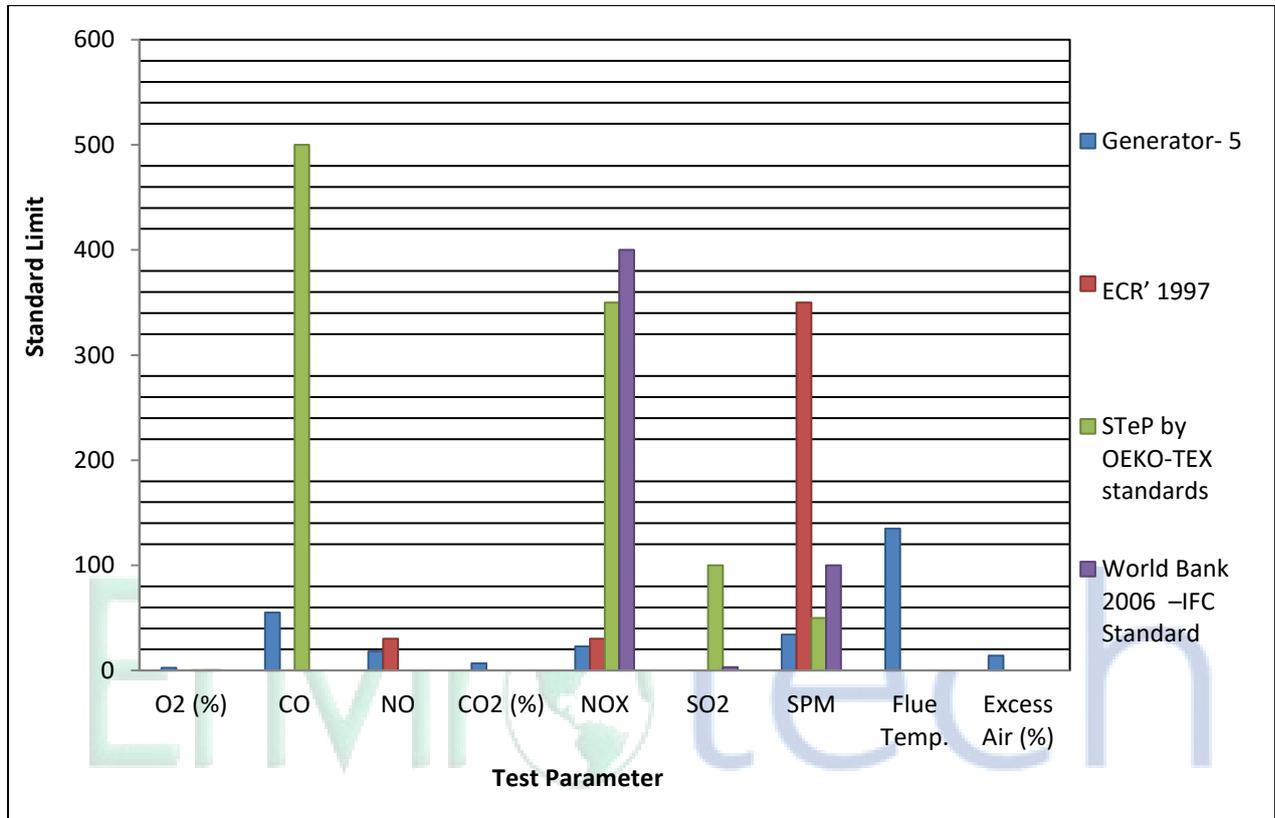


Figure: Graphical presentation of the stack Air emission Level

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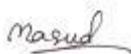
Mass/ Amount of Substance of Generators

Sample	Mass/ Amount of Substance (Unit- Kg)							
	Running Hour	O ₂	CO	NO	CO ₂	NO _x	SO ₂	SPM
Generator-1	2688	276.32	0.4537344	0.21504	744.0384	0.301056	0.00	0.448352
Generator-2	116.84	10.936	0.02018995	0.010749	31.59353	0.011217	0.00	0.015705
Generator-3	57.92	5.5603	0.00861849	0.006023	17.26016	0.006487	0.00	0.010816
Generator-4	21.58	2.0026	0.00217526	0.001812	5.429528	0.002331	0.00	0.004230
Generator-5	1	0.1036	0.0002208	0.000072	0.276	0.000092	0.00	0.000210

Source: Field Assessment on 17-01-2021 & 18-01-2021

Note:

- i) The above data has been calculated as per running hours exposures.
- ii) 1 Gram per mole (g/mole) is equal 0.001 Kilogram per mole (kg/mole)
- iii) $1 \mu\text{g}/\text{m}^3 = 0.000001 \text{ kg}/\text{m}^3$
- iv) $1 \text{ mg}/\text{kg} = 1 \text{ part}/\text{million (ppm)}$
- v) $1\% = 10000 \text{ ppm}$



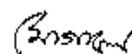
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Sampling Description:

Name of Combustion Unit : Boiler-1
Fuel Type : Natural Gas

Key Information Boiler (No.- 1)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 7673
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-99
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

Relevant Weather Conditions During the Test Period:

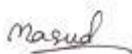
Temperature Level	27.3°C
Humidity Level	64.9 %
Ambient Weather	Sun Shined
Flue Pressure	0.74165 Mpa
Flue Temperature (°C.)	190.5°C
Excess Air (%)	13.58%

Inspection Result of Stack Air Emission (Boiler- 1)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.50	10.2	42.1	7.72	34.2	0	33
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



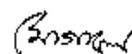
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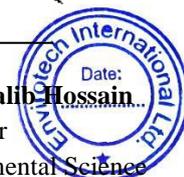
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Graphical presentation of Stack Air Emission (Boiler- 1)

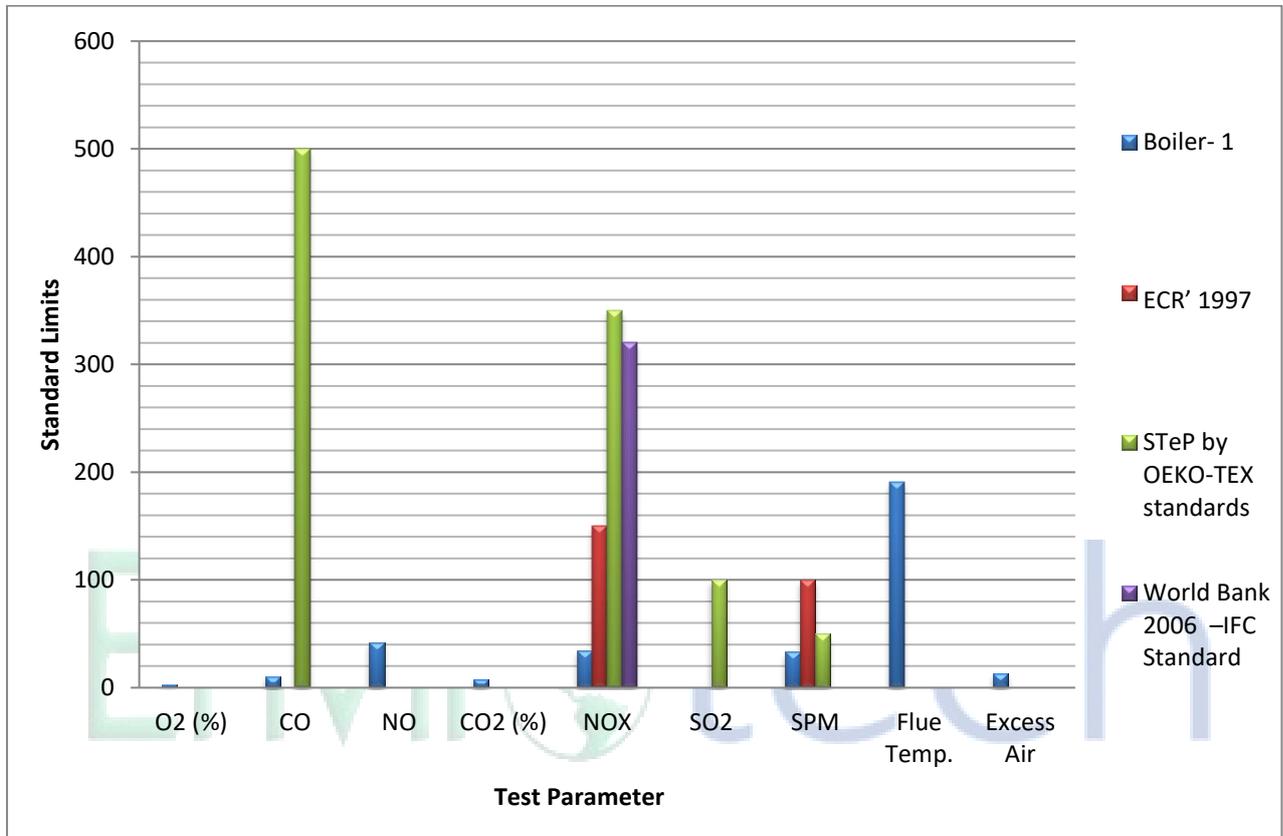


Figure: Graphical presentation of the stack Air emission Level

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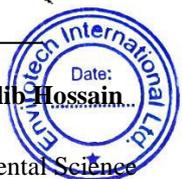
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Name of Combustion Unit : Boiler-2
Fuel Type : Natural Gas

Key Information Boiler (No.- 2)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 6409
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

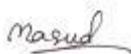
Relevant Weather Conditions During the Test Period:	
Temperature Level	27.2°C
Humidity Level	64.1 %
Ambient Weather	Sun Shined
Flue Pressure	0.65334 Mpa
Flue Temperature (°C.)	168.0°C
Excess Air (%)	16.11%

Inspection Result of Stack Air Emission (Boiler- 2)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.90	24	24.2	8.67	53.6	0	24
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



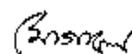
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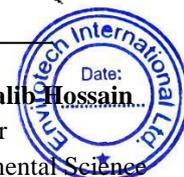
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Graphical presentation of Stack Air Emission (Boiler-2)

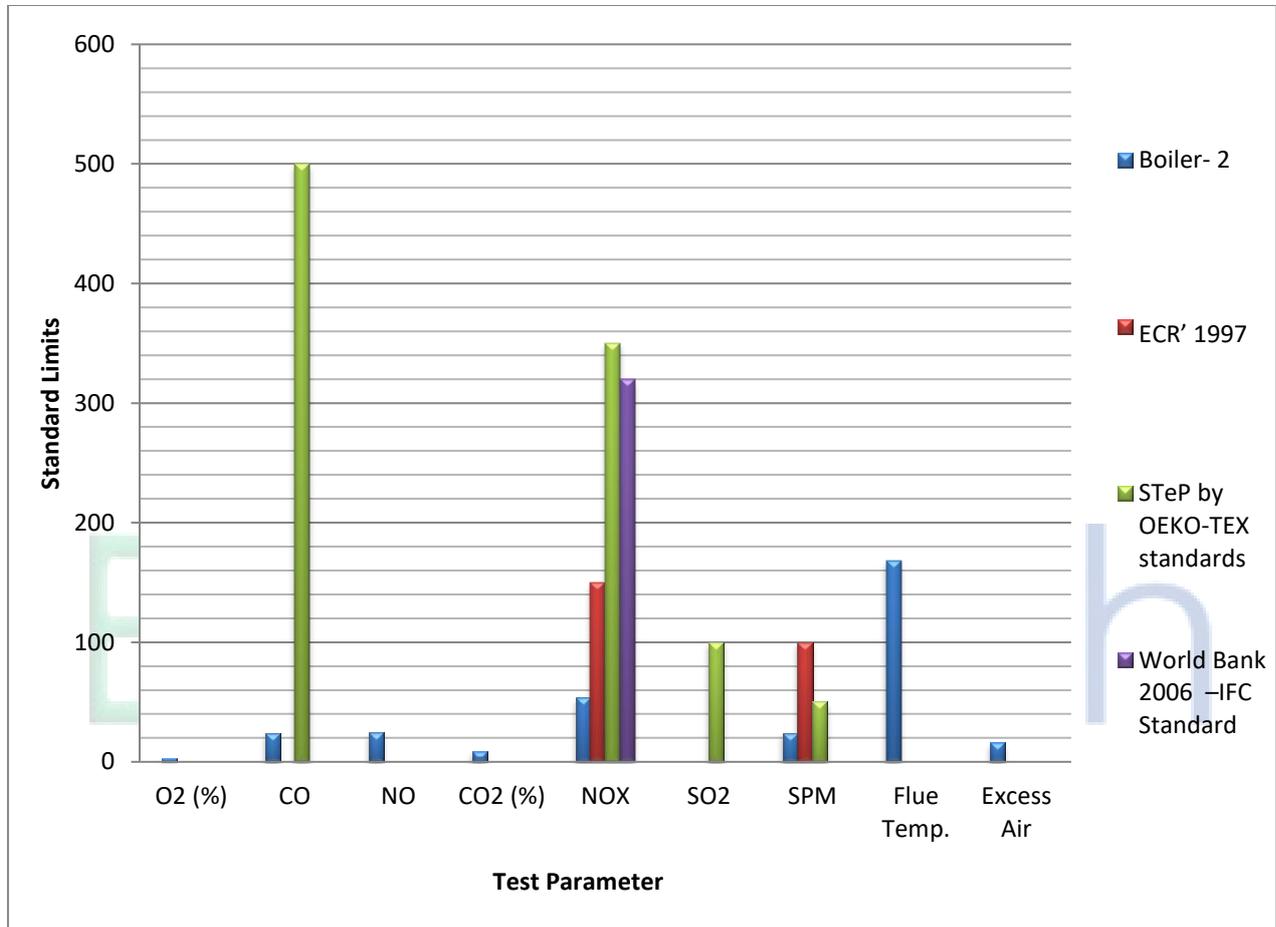


Figure: Graphical presentation of the stack Air emission Level

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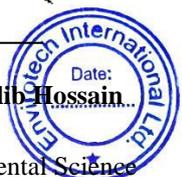
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Name of Combustion Unit : Boiler-3
Fuel Type : Natural Gas

Key Information Boiler (No.- 3)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 8608
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

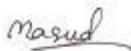
Relevant Weather Conditions During the Test Period:	
Temperature Level	27.7°C
Humidity Level	64.8 %
Ambient Weather	Sun Shined
Flue Pressure	0.70887 Mpa
Flue Temperature (°C.)	171.2°C
Excess Air (%)	17.94%

Inspection Result of Stack Air Emission (Boiler- 3)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	3.18	5.2	20.2	7.16	36.2	0	28
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



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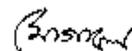


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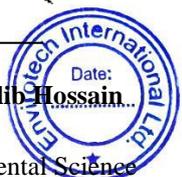


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Graphical presentation of Stack Air Emission (Boiler- 3)

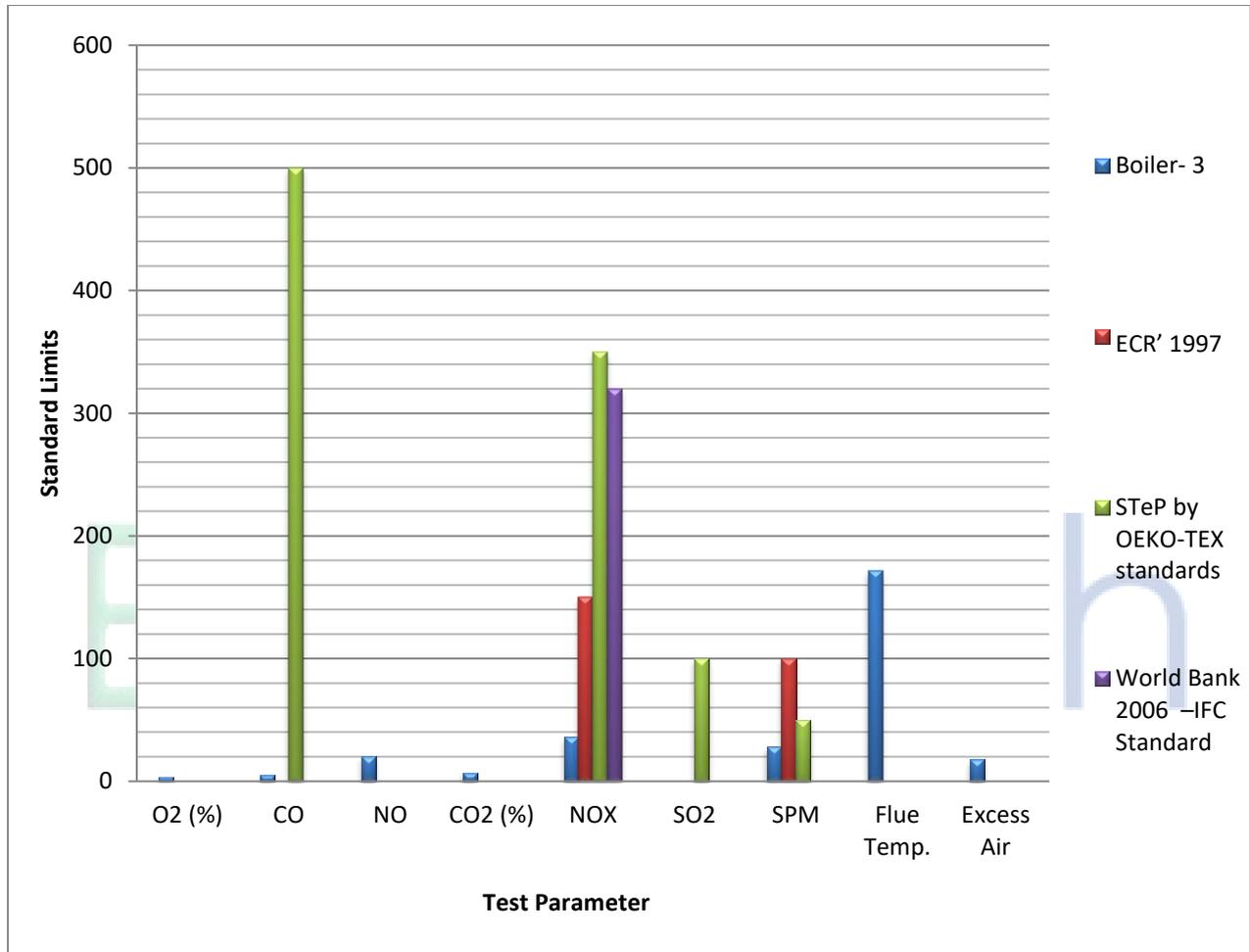


Figure: Graphical presentation of the stack Air emission Level

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Name of Combustion Unit : Boiler-4
Fuel Type : Natural Gas

Key Information Boiler (No.- 4)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 6673
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

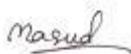
Relevant Weather Conditions During the Test Period:	
Temperature Level	27.9°C
Humidity Level	64.5 %
Ambient Weather	Sun Shined
Flue Pressure	0.72398 Mpa
Flue Temperature (°C.)	167.4°C
Excess Air (%)	14.20%

Inspection Result of Stack Air Emission (Boiler- 4)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.60	25	46	9.67	40.8	0	33
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021



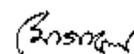
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Graphical presentation of Stack Air Emission (Boiler- 4)

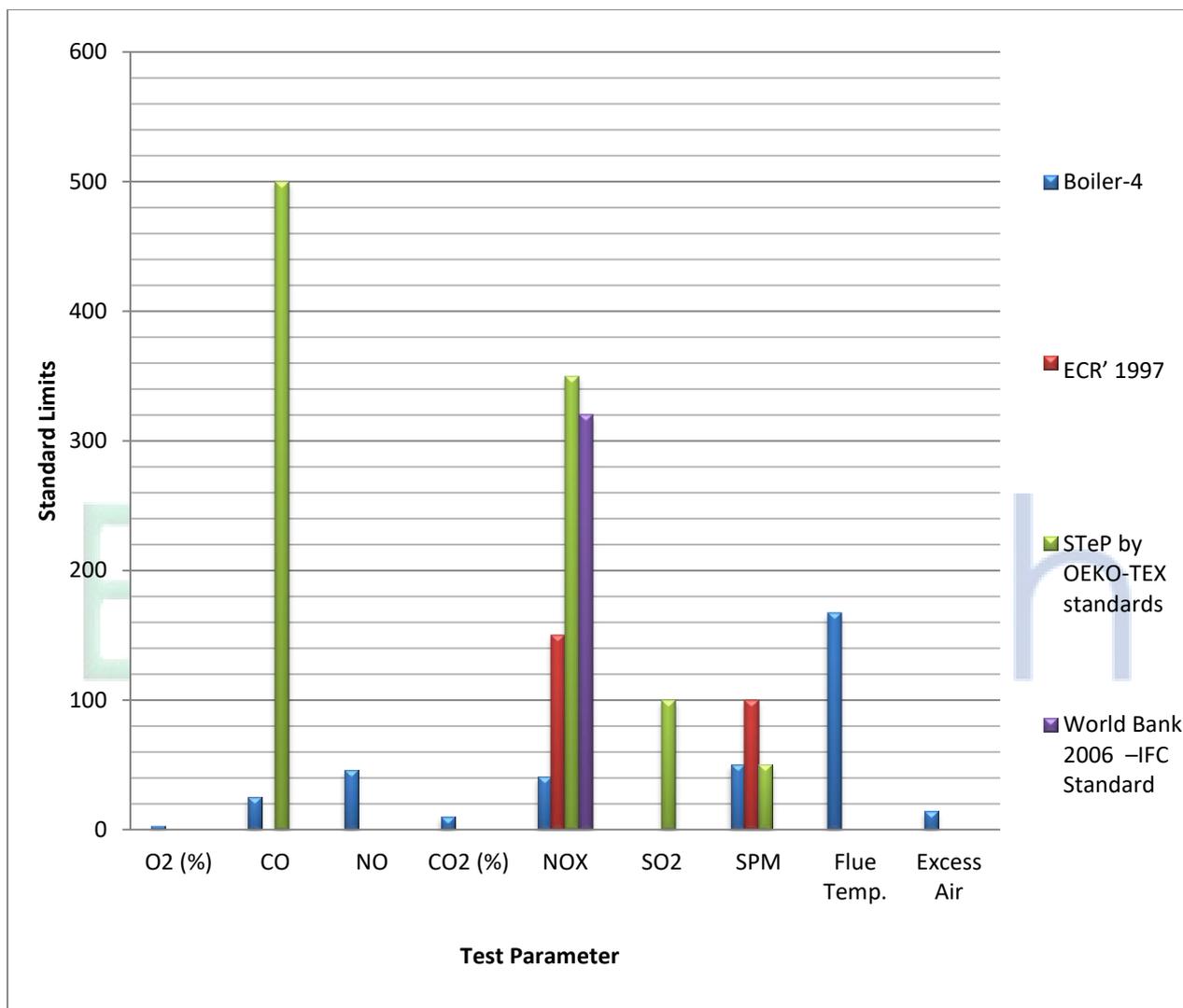


Figure: Graphical presentation of the stack Air emission Level

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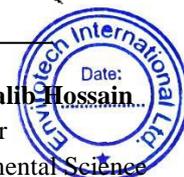
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Name of Combustion Unit : Boiler-5
Fuel Type : Natural Gas

Key Information Boiler (No.- 5)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 7422
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine Maintenance/ Repair Status	Good
Total Running Hours (Last One Year)	2510 Hours

Relevant Weather Conditions During the Test Period:	
Temperature Level	27.5°C
Humidity Level	64.4 %
Ambient Weather	Sun Shined
Flue Pressure	0.88134 Mpa
Flue Temperature (°C.)	180.5°C
Excess Air (%)	14.83%

Inspection Result of Stack Air Emission (Boiler- 5)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.70	20	39.3	6.7	53.0	0	37
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

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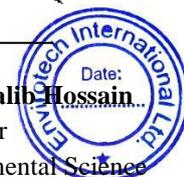
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Graphical presentation of Stack Air Emission (Boiler- 5)

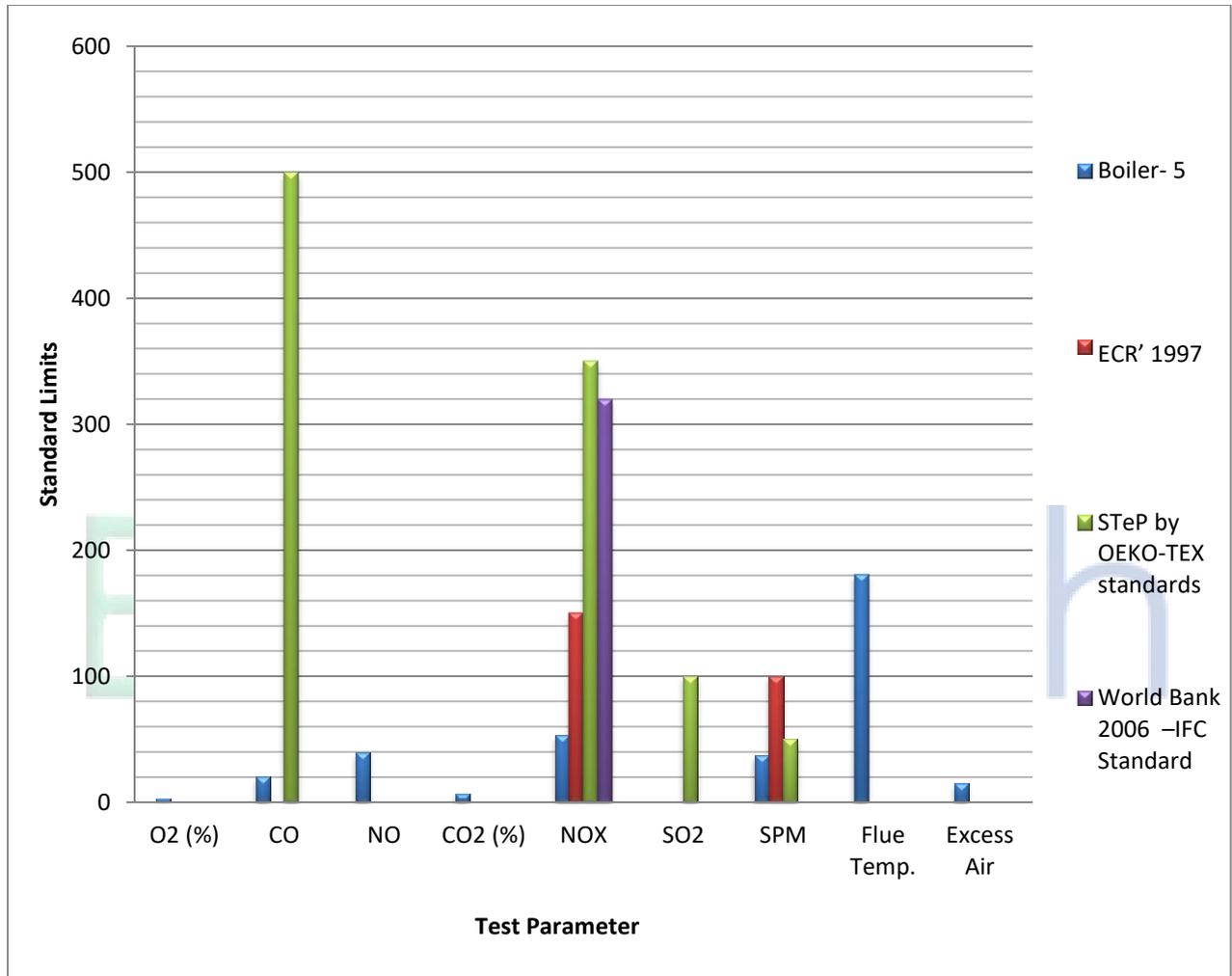


Figure: Graphical presentation of the stack Air emission Level

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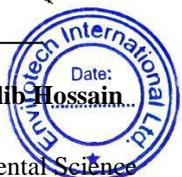
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Name of Combustion Unit : Boiler-6
Fuel Type : Natural Gas

Key Information Boiler (No.- 6)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 7419
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

Relevant Weather Conditions During the Test Period:

Temperature Level	27.5°C
Humidity Level	64.8 %
Ambient Weather	Sun Shined
Flue Pressure	0.77975 Mpa
Flue Temperature (°C.)	118.5°C
Excess Air (%)	14.20%

Inspection Result of Stack Air Emission (Boiler- 6)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.60	24.1	42.1	6.80	43.2	0	31
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

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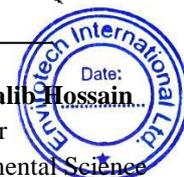
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Graphical presentation of Stack Air Emission (Boiler- 6)

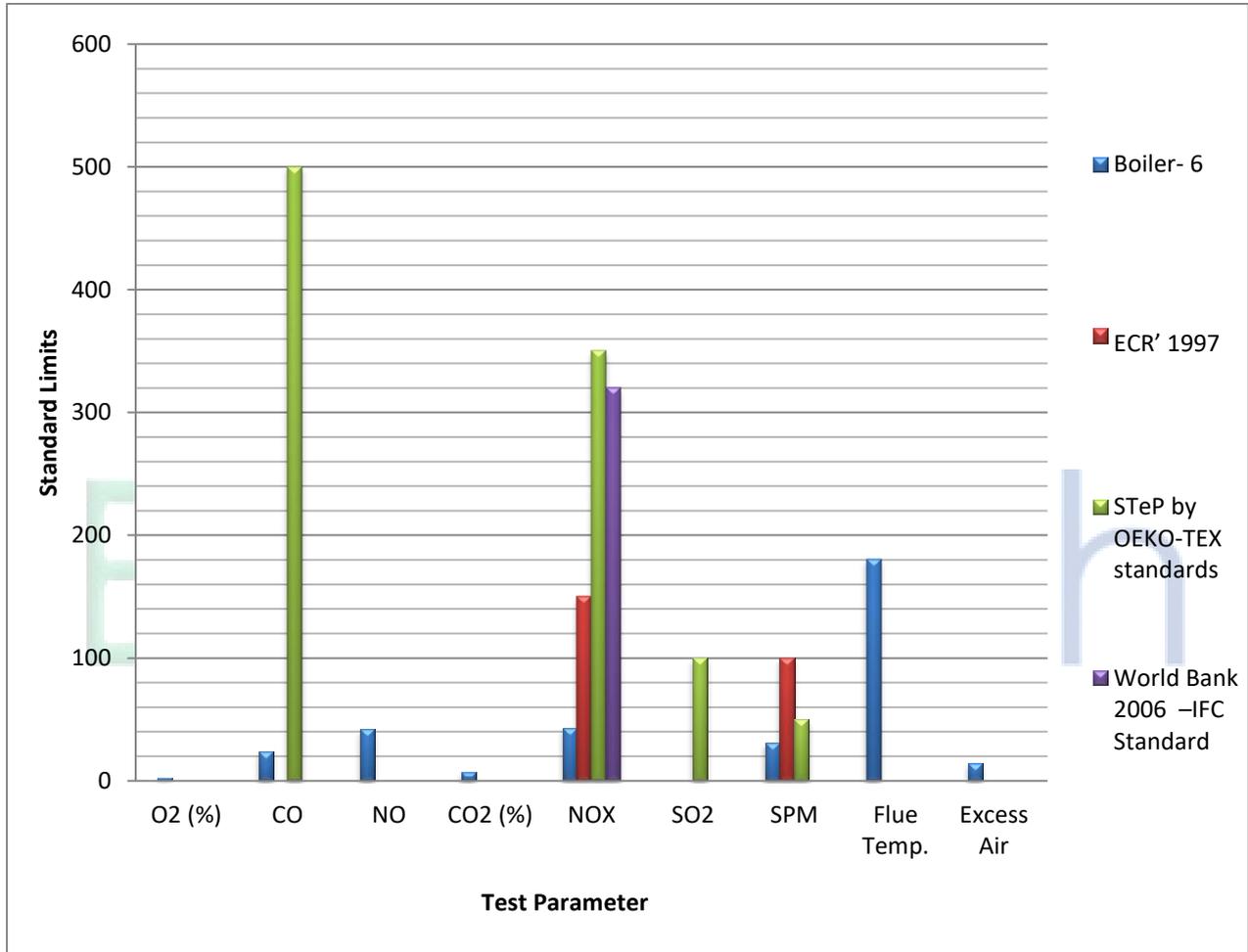


Figure: Graphical presentation of the stack Air emission Level

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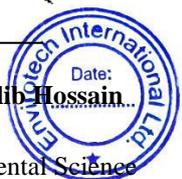
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Name of Combustion Unit : Boiler-7
Fuel Type : Natural Gas

Key Information Boiler (No.- 7)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 7418
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

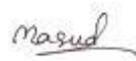
Relevant Weather Conditions During the Test Period:	
Temperature Level	27.7°C
Humidity Level	64.5%
Ambient Weather	Sun Shined
Flue Pressure	0.86540 Mpa
Flue Temperature (°C.)	190.2°C
Excess Air (%)	19.42%

Inspection Result of Stack Air Emission (Boiler- 7)

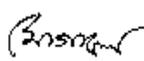
Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	3.4	6.6	40.8	7.88	40.6	0	23
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

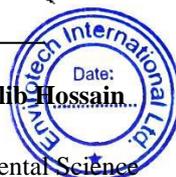
Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021


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Graphical presentation of Stack Air Emission (Boiler- 7)

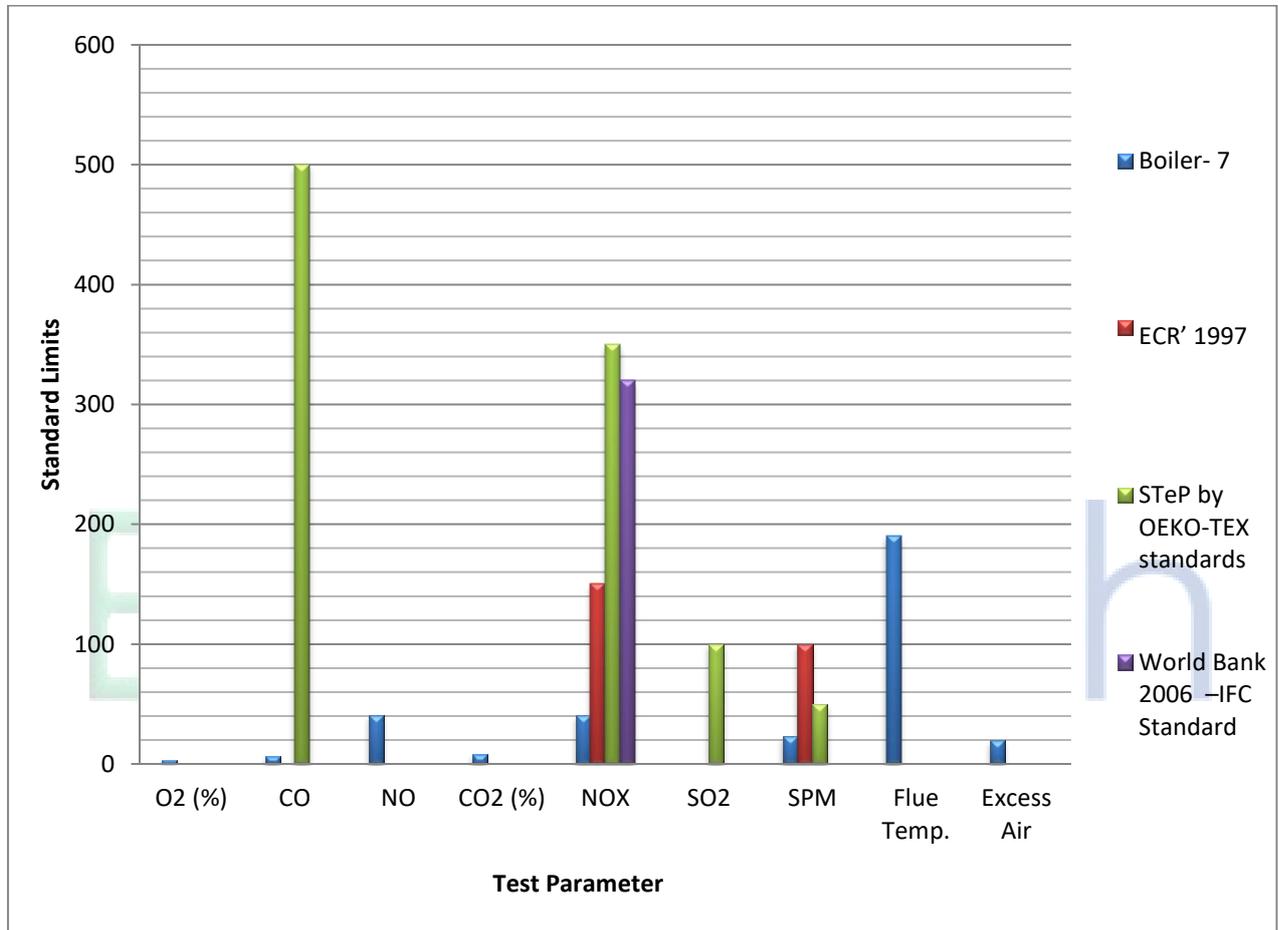


Figure: Graphical presentation of the stack Air emission Level

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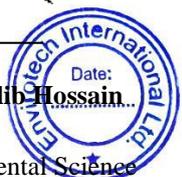
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Name of Combustion Unit : Boiler-8
Fuel Type : Natural Gas

Key Information Boiler (No.- 8)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 9896
Capacity	500 Kg/hr
Supplier Name	Modern Erection Ltd.
Origin	Bngladesh
Model/Brand	MEL 500 TL-100N 1
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

Relevant Weather Conditions During the Test Period:	
Temperature Level	27.1°C
Humidity Level	41.7 %
Ambient Weather	Sun Shined
Flue Pressure	0.72998 Mpa
Flue Temperature (°C.)	188.6°C
Excess Air (%)	15.46%

Inspection Result of Stack Air Emission (Boiler- 8)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	2.80	7.9	62.4	8.68	74.41	0	32
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

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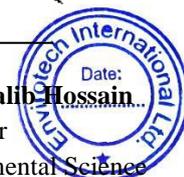
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Graphical presentation of Stack Air Emission (Boiler- 8)

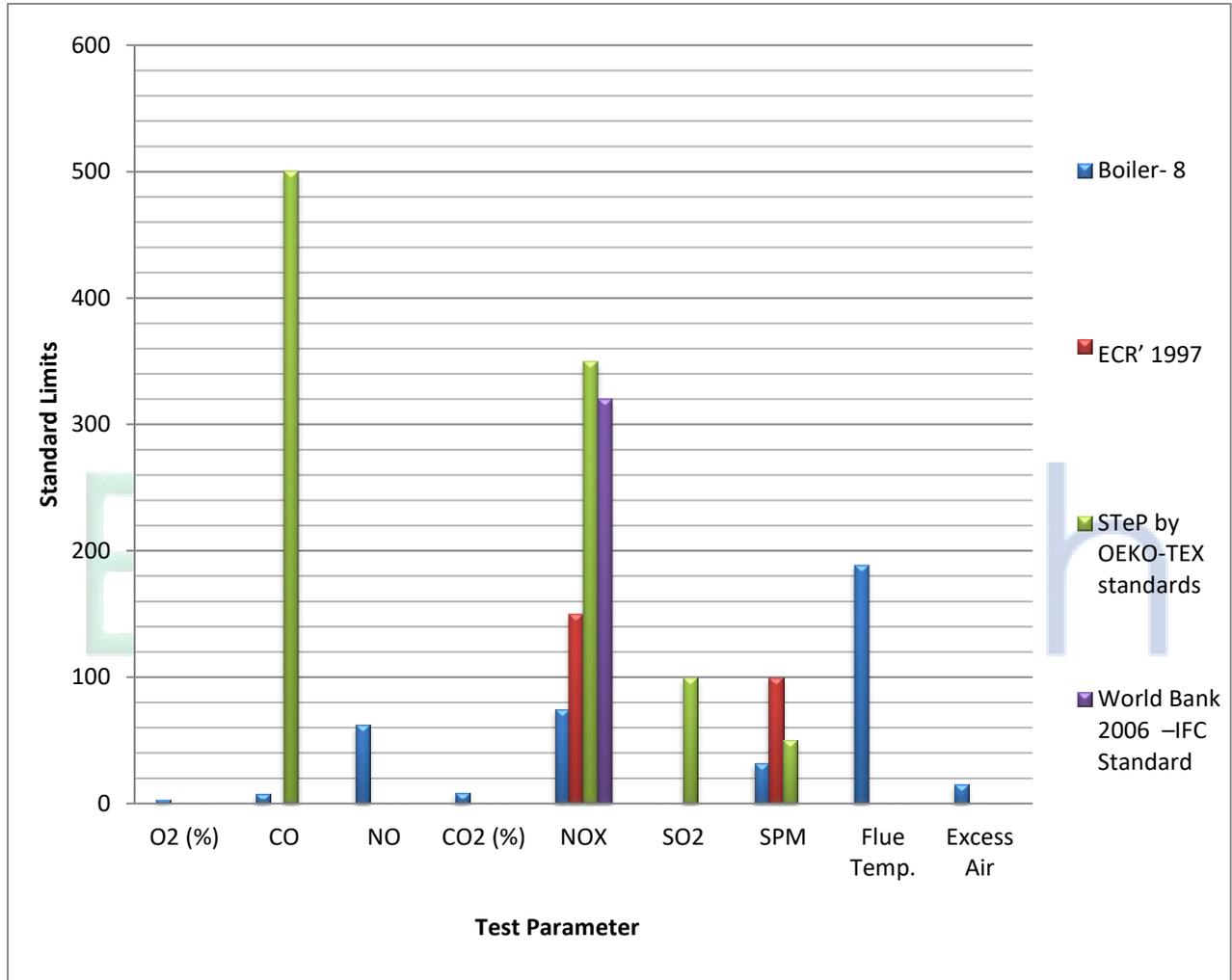


Figure: Graphical presentation of the stack Air emission Level

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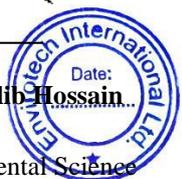
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Name of Combustion Unit : Boiler-9
Fuel Type : Natural Gas

Key Information Boiler (No.- 9)	
Location	Building-1 (Ground Floor)
Registration No.	BA. BO. 5019
Capacity	150 Kg/hr
Supplier Name	SSANG MA Machinery
Origin	China
Model/Brand	SM 150
Machine maintenance/ Repair Status	Good
Total Running Hours (last one year)	2510 Hours

Relevant Weather Conditions During the Test Period:	
Temperature Level	28.4°C
Humidity Level	64.6 %
Ambient Weather	Sun Shined
Flue Pressure	0.72170 Mpa
Flue Temperature (°C.)	195.1°C
Excess Air (%)	21.51%

Inspection Result of Stack Air Emission (Boiler- 9)

Standard Permissible Limit for Gas Boiler	Obtained value						
	O ₂ %	CO mg/m ³	NO mg/m ³	CO ₂ %	NO _x mg/m ³	SO ₂ mg/m ³	SPM
Obtained Value (Collected data)	3.70	23.2	60.3	7.4	70.3	0	39
ECR' 1997, Schedule-12 (E), (mg/Nm ³ or as indicated)	NYS	NYS	NYS	NYS	150	NYS	100
World Bank 2006 –IFC Standard (mg/Nm ³ or as indicated)	3	NYS	NYS	NYS	320	NYS	NYS
STeP by OEKO-TEX standards (mg/Nm ³)	3	500	NYS	NYS	350	100	50

Note: Result is the average of collected data of five run time (3 minutes interval).

Source: Field Assessment on 17-01-2021 & 18-01-2021

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Graphical presentation of Stack Air Emission (Boiler- 9)

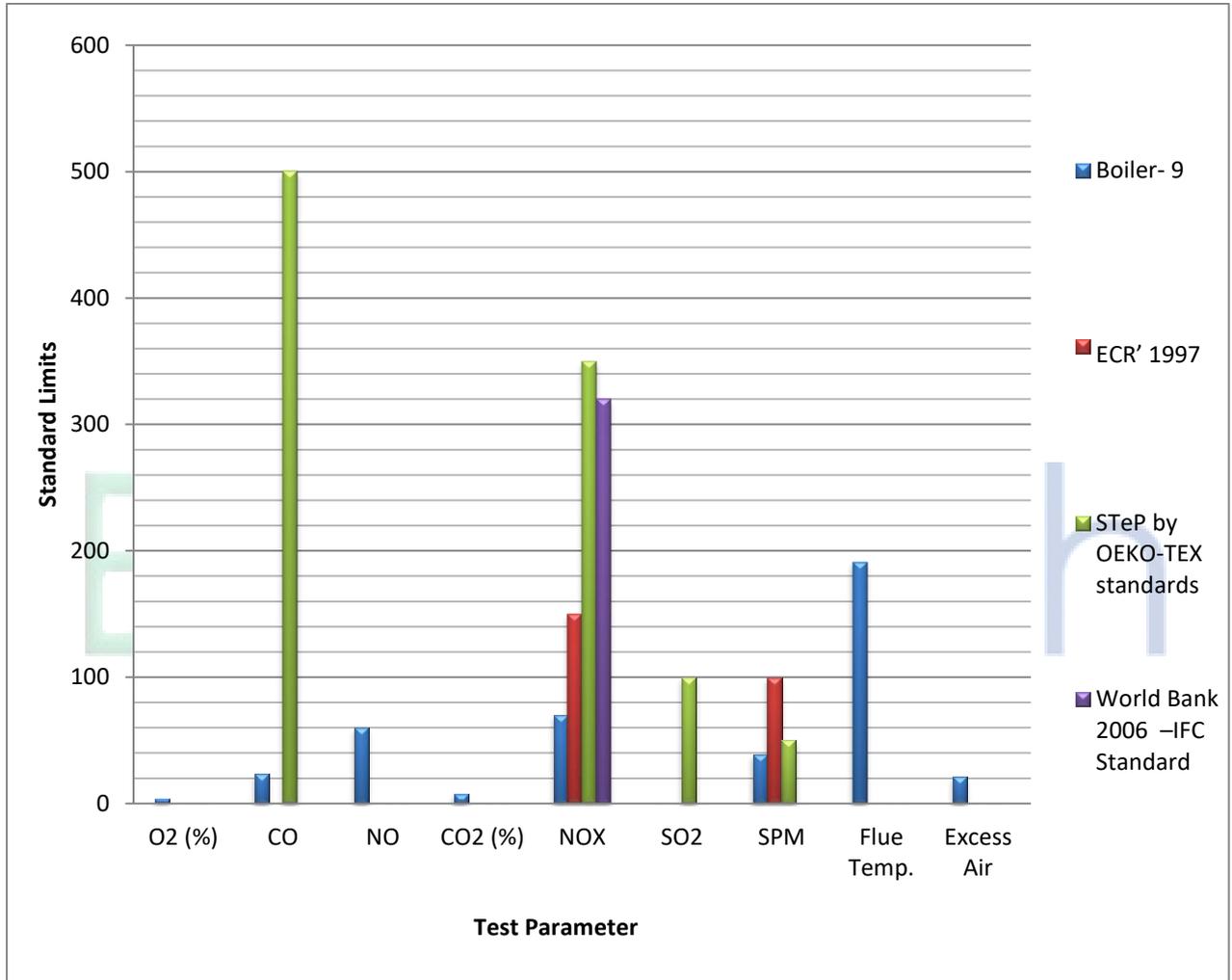


Figure: Graphical presentation of the stack Air emission Level

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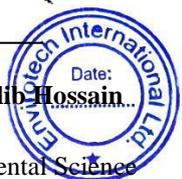
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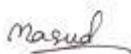
Mass/ Amount of Substance of Boilers

Boiler No.	Running Hour	Mass/ Amount of Substance (Unit- Kg)						
		O ₂	CO	NO	CO ₂	NO _x	SO ₂	SPM
1	2510	251	0.102408	0.422684	775.088	0.343368	0.00	0.332120
2	2510	291.16	0.24096	0.242968	870.468	0.538144	0.00	0.242160
3	2510	319.272	0.052208	0.202808	718.864	0.363448	0.00	0.282320
4	2510	261.04	0.251	0.46184	970.868	0.409632	0.00	0.304008
5	2510	271.08	0.2008	0.394572	672.68	0.532120	0.00	0.331116
6	2510	261.04	0.241964	0.422684	682.72	0.433728	0.00	0.312440
7	2510	341.36	0.066264	0.409632	791.152	0.407624	0.00	0.220072
8	2510	281.12	0.079316	0.626496	871.472	0.747076	0.00	0.324088
9	2510	371.48	0.232928	0.605412	742.96	0.705812	0.00	0.393364

Source: Field Assessment on 17-01-2021 & 18-01-2021

Note:

- The above data has been calculated as 7728 hours Exposures
- 1 Gram per mole (g/mol) is equal 0.001 Kilogram per mole (kg/mol)
- $1 \text{ mg/m}^3 = 0.000001 \text{ kg/m}^3$
- $1 \text{ mg/kg} = 1 \text{ part/million (ppm)}$
- $1\% = 10000 \text{ ppm}$



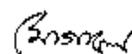
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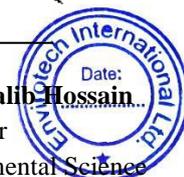
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GREENHOUSE GASES (GHGs)

Alternative Title: GHG

Greenhouse gas, any gas that has the property of absorbing infrared radiation (net heat energy) emitted from Earth's surface and reradiating it back to Earth's surface, thus contributing to the greenhouse effect. Carbon dioxide, methane, and water vapor are the most important greenhouse gases. (To a lesser extent, surface-level ozone, nitrous oxides, and fluorinated gases also trap infrared radiation.) Greenhouse gases have a profound effect on the energy budget of the Earth system despite making up only a fraction of all atmospheric gases. Concentrations of greenhouse gases have varied substantially during Earth's history, and these variations have driven substantial climate changes at a wide range of timescales. In general, greenhouse gas concentrations have been particularly high during warm periods and low during cold periods.

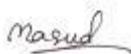
Greenhouse gases

Greenhouse gases are those that absorb and emit infrared radiation in the wavelength range emitted by Earth. In order, the most abundant greenhouse gases in Earth's atmosphere are:

- Water vapor (H₂O)
- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrous oxide (N₂O)
- Ozone (O₃)
- Chlorofluorocarbons (CFCs)
- Hydrofluorocarbons (includes HCFCs and HFCs)

Greenhouse Effect in Bangladesh

The greenhouse effect is an increase in the average temperature of the earth. It happens because certain gases called greenhouse gases absorb infrared heat that would normally be radiated into space. The problems begin when human activities distort and accelerate the natural process by creating more greenhouse gases in the atmosphere than are necessary to warm the planet to an ideal temperature. Climate change driven by global warming in Bangladesh is threatening to substantially modify important ecosystems because the rate of climate change exceeds rates at



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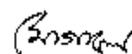


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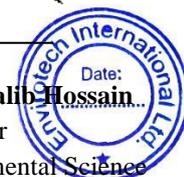


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which ecosystems and biodiversity they can adapt or migrate. The government of Bangladesh has set up the Ministry of Environment and Forest (MOEF) in 1989 with two major departments under it namely the Department of Environment (DOE) and Forest Department (FD) to address the emerging environment related issues. The government has also developed and adopted an Environment policy in 1992 and an Environment protection act in 1995 as well as a National Environment Management Action Plan (NEMAP) in 1996. Under the Environment Protection Act, 1995 government also prepared and adopted the Environment Protection Regulation, 1997. Bangladesh is a developing country in south Asia with an area of 147,570 square kilometers and a population of 150.5 million (2011 census). The physical environment of Bangladesh is diverse. There is a mix of both traditional and modern methods of land use. This complexity of environment and land use patterns has important implications for the vulnerability and depletion of the natural resource base in the country. Floods are common in Bangladesh, where flood plains constitute about four fifths of the landmass. The adverse impacts of floods become particularly extensive and severe when the effect of drainage congestion is combined with several other factors including excessive rainfall in the Ganges- Brahmaputra-Meghna basin. Being one of the world's most vulnerable countries from the point of view of climate change, the government and the people of Bangladesh are sensitive to environmental issues.

Protection of Greenhouse Effect

There is no independent law in Bangladesh to address the problems of greenhouse effect in Bangladesh. The national policies, laws, rules and committees that Bangladesh have are all related to environmental issues. The important of them are: National Environmental Policy, 1995, The Environmental Conservation Act, 1995, Bangladesh Environmental Conservation Rules, 1997, Ministry of Forest and Environment, Directorate of Environment, The Industrial Act, 1937 and 1992, and National Committee for Formulation of Integrated Environmental Guidelines.

Greenhouse Gases (GHG s) Inventory

This GHG inventory estimates the GHG emission such as CO₂ emitted by The Rose Dresses Ltd., Islam Garments Ltd. and Islam Dresses Ltd. from their utility sector. The Rose Dresses Ltd., Islam

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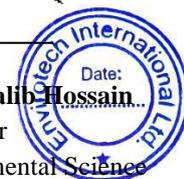
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Garments Ltd. and Islam Dresses Ltd. are ready-made garment manufacturing industry situated in Jamgora, Ashulia, Savar, Dhaka. This inventory is prepared as per the request of factory management as the factory is interested to quantify its annual CO₂ emission which will help them to incorporate carbon cost in decision making as well as to identify cost saving opportunity.

Scope & Boundaries

The annual GHG emission is estimated in following scopes:

Name of Unit	Types of Fuel used
Generator	Natural Gas /Diesel
Boiler	Natural Gas

Organizational Boundary

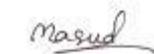
Total CO₂ emission is considered for the sector of The Rose Dresses Ltd., Islam Garments Ltd. and Islam Dresses Ltd. as the factories identify that utility is the main and major source of their GHG emission. In this inventory three greenhouse gasses emission are considered and these are CO₂, CH₄ & N₂O. The total GHG emission is considered for total diesel combustion and total gas combustion and total diesel/natural gas used in this factory. Fuel properties data (Net Calorific Value, Density) are unavailable at the factory, so some assumptions are done to estimate fuel properties.

RESULT OF GHGs INVENTORY

Sl.	Combustion Unit	GHGs Emission			
		CO ₂ Tonnes	CH ₄ Tonnes	N ₂ O Tonnes	All GHGs (Tonnes CO ₂ e)
1	Generator-1	1084.964	0.019339824	0.00193398	1086.018
2	Generator-2	7.215822	0.000292139	0.00005842	7.239486
3	Generator-3	2.986965	0.00012093	0.00002418	2.99676
4	Generator-4	0.267649	0.000010836	0.00000216	0.268527
5	Boilers	763.1374	0.013603162	0.00136031	763.8787
Total GHG emissions from fossil fuels (tonnes CO ₂ e)					1860.402

Source: Green House Gas Protocol

Note: The entire inventory conducted on last 12 months fuel consumption (provided by Factory).

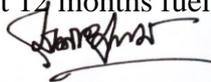


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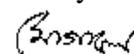


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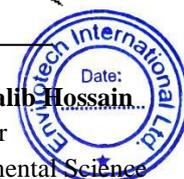


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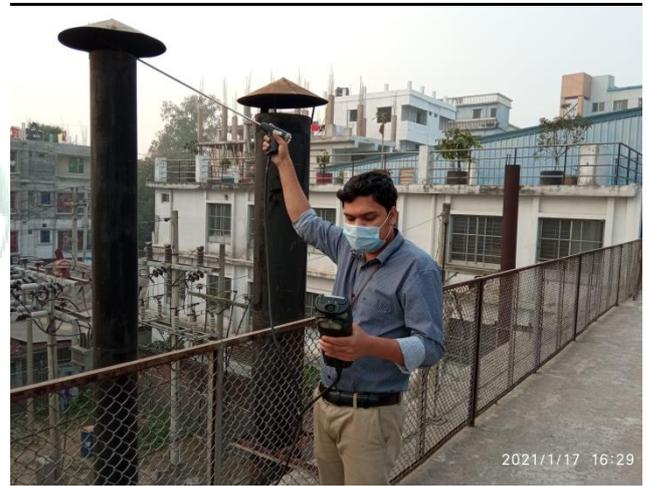
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Images of Data Collection



Stack Air Emission Test

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