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Attachment F

F. Control and Monitoring

F.1 Treatment, Abatement and Control Systems

Details of treatment/abatement systems (air and effluent emissions) should be included, together with schematics as appropriate.
For each Emission Point identified complete Table F.1(i) and include detailed descriptions and schematics of all abatement systems.
Attachment N^{o} F.1 should contain any supporting information.

F.1.1 Atmospheric Emission Treatment, Abatement and Control

Natural gas is a clean fuel resulting in negligible emissions of particulate matter and SO_2. The main atmospheric pollutant of concern for CCGT plants firing on natural gas is NO_x. The plant will comprise proven pollution prevention and control technology which will limit the emission of NO_x, i.e. low NO_x burners.

The plant will run on distillate, with a sulphur content of less than 0.1%, in the event of interruption to the natural gas supply. The plant will only operate on distillate oil in emergency situations and for short duration testing, national policy regarding duration of testing is currently being agreed between CER and EirGrid. Water injection will be employed when the plant is running on distillate to further reduce emissions of NO_x.

A detailed air emission impact assessment is included in Attachment I.1 *Assessment of Atmospheric Emissions*.

Distillate will be stored in one of the existing tanks, which will be previously refurbished. In accordance with the requirements of CER, approximately 11,000 m^3 of distillate oil will be required to be stored. Tank loading and unloading will be undertaken in accordance with standard operating procedures, manufacturer's specifications and best practice guidelines, including *IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities, EPA (2004)*. Losses will be minimised through effective site management techniques and training.

The number of potential sources of leaks from the plant will be minimised through plant design, for example the gas pipe will be welded thereby avoiding the use of flanges and valves wherever possible. Where appropriate, valves and flanges will be fitted with leak detection alarms connected to the main control room ensuring a rapid response in the event of an abnormal occurrence. Reductions in gas pressures will also be detected promptly in the main turbine enclosure.

Endesa Ireland Ltd. will enter into a Long Term Services Agreement (LTSA) with the supplier to service the gas turbine and main auxiliaries at pre-determined intervals. A Planned Preventative Maintenance Programme (PPMP) will also be developed, in accordance with manufacturer's specifications, incorporating all abatement and control systems as well as plant, pipes, valves and flanges with a potential atmospheric emission source as deemed

appropriate. All defects will be prioritised. Defects associated with health and safety and environmental equipment will be given highest priority and action will be taken immediately.

Operation of the plant will incorporate the following measures in order to ensure thermal efficiency:

- The plant will operate on an advanced computerised control system which will ensure optimum combustion conditions and high boiler performance that support the reduction of emissions.
- Natural gas and feedwater will be preheated by steam prior to use.
- The plant design will minimise the amount of heat lost due to unburned gases and excess air.
- The plant will operate under optimum pressure and temperature conditions whenever possible. The plant design will employ the use of advanced materials capable of reaching the levels required.
- Inlet air will be fitted with a self-cleaning fabric filter in order to prevent the ingress of particulate matter.
- Operation of the plant will include daily maintenance measures such as raw water pre-treatment, boiler blow-down and chemical treatment of the boiler water thereby optimising efficiency and minimising energy consumption.

The plant will operate to 58% efficiency. The high rate of thermal efficiency, and subsequent reduction in greenhouse gases, is in accordance with the requirements of BAT.

With the implementation of these control measures, emissions from the plant will not exceed the atmospheric emission limit values for new CCGT plant, as defined in the *BAT Guidance Note on Best Available Techniques for the Energy Sector (Large Combustion Plant Sector) (1st Edition), EPA,* 2008, the *Large Combustion Plant Regulations 2003 (SI 644/2003*) and the *Common Position adopted by the Council with a view to the adoption of a Directive on industrial emissions (Brussels, 16 November 2009)*. A summary of the applicable limit values is provided in Table E.1.1 from the Attachment E.1: *Emissions to Atmosphere*.

Table F.1(i) shows the treatment, abatement and control systems implemented for the main emission point identified in Attachment E.1. —A2-1 Gas Turbine Main Stack— both for the firing on natural gas scenario and for the firing on distillate fuel oil scenario.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

Emission point reference number : **A2-1 (Main Stack firing on natural gas)**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
NO_x	Dry low NOx burners	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	In accordance with manufacturer's specifications	Maintenance suppies Stock of demineralised water stored on site
CO	Controlled combustion	As above	As above	As above
Temperature	As above	As above	As above	As above
O_2	As above	As above	As above	As above
Efflux Velocity	As above	As above	As above	As above
SO_2	Low sulphur fuel	N/A	N/A	N/A
Particulate Matter	Fuel type	N/A	N/A	N/A

N/A: Not Applicable — No Equipment

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
NO_x	Continuous	In-situ Proprietary Continuous Emission Monitoring System (CEMS)	In accordance with manufacturer's specifications
CO	Continuous	As above	As above
Temperature	Continuous	As above	As above
O_2	Continuous	As above	As above
SO_2	Annually	Standard Equipment	As above
Particulate Matter	Annually	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

Emission point reference number **:** **A2-1 (Main Stack firing on distillate oil)**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
NO_x	Dry low NOx burners and water injection	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	In accordance with manufacturer's specifications	Maintenance suppies Stock of demineralised water stored on site
CO	Controlled combustion	As above	As above	Maintenance supplies
Temperature	As above	As above	As above	As above
O_2	As above	As above	As above	As above
Efflux Velocity	As above	As above	As above	As above
SO_2	Low sulphur fuel	N/A	N/A	N/A
Particulate Matter	Fuel type	N/A	N/A	N/A

N/A: Not Applicable — No Equipment

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
NO_x	Continuous	In-situ Proprietary Continuous Emission Monitoring System (CEMS)	In accordance with manufacturer's specifications
CO	Continuous	As above	As above
Temperature	Continuous	As above	As above
O_2	Continuous	As above	As above
SO_2	Annually (in conjunction with distillate testing regime)	Standard Equipment	As above
Particulate Matter	Annually (in conjunction with distillate testing regime)	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

F.1.2 Effluent Emission Treatment, Abatement and Control

As described in Attachment E.2 *Emissions to Surface Water* treated foul water and process waste water, comprising effluent from the demineralisation plant, condensate drains and boiler blowdown, will be discharged.

The waste water will be dosed automatically, if required, to regulate the pH to pH 6-9 (in general, boiler water is maintained at a slightly alkaline pH of 9). Any solids collected in the waste water treatment plant will be removed from site by authorised contractors.

All surface water from hardstanding areas will drain via a Class 1 bypass oil interceptor and silt trap unit, prior to discharge via existing Outfall SW4 and SW12. Surface water runoff from the AGI area, and its access road, will also be conveyed by a new collection system and treated via a silt trap unit and bypass oil interceptor prior to discharge via existing Outfall SW1.

Water collected in bunded areas (i.e. bulk storage tanks) will be required to be pumped (rather than gravity fed) in order to minimise the potential for contaminated water entering the drainage system. All bulk storage tanks will be fitted with automatic control systems to prevent overfilling.

All chemical conditioning materials required for boiler feedwater (i.e. aqueous Ammonia, Tri-sodium Phosphate and Carbohydrazide) will be stored under cover in UN approved containers. The chemical storage room will incorporate dedicated integral bunds. Spills and leaks will be cleaned by appropriately experienced personnel using absorbent materials. The waste arising will be disposed of off-site by appropriately authorised contractors.

A bunded distillate tank with the necessary containment measures is provided in order to fully contain the volume of distillate stored in the unlikely event of a catastrophic tank failure. Water collected in the tank bund will require pumping to the surface water attenuation tank via the silt trap and oil/water interceptor.

Process waste water, surface water run-off and foul water will be discharged through separate channels fitted with non-return shut-off valves. The discharges will be treated and monitored where necessary prior to discharge to the Barrow-Suir-Nore Estuary.

Monitoring equipment will be included in the PPMP in accordance with manufacturer's specifications and best practice guidelines. Records of checks, calibrations and maintenance checks will be retained on site. Pipes, bunds and storage facilities will be regularly checked for deterioration, damage and leaks. Integrity testing and the maintenance of all waste water abatement, control and monitoring equipment will be incorporated into the on site maintenance programmes. All equipment will be maintained and calibrated in accordance with manufacturer's specifications.

Table F.1(i) is also filled in for each Surface Water Emission Point identified in Attachment E.2: *Emissions to surface water.*

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number :*** **SW1 – Surface water run-off from the AGI area**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
TPH	Oil interceptor	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	N/A	N/A
Suspended Solids	Silt Trap	As above	As above	As above

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Conductivity	Daily	Standard Equipment	In accordance with manufacturer's specifications
Suspended Solids	Daily	As above	As above
pH	Daily	As above	As above
TPH	Daily	As above	As above
BOD	Monthly	As above	As above
COD	Monthly	As above	As above
Ammonia (as N)	Monthly	As above	As above
Total Phosphorous	Monthly	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.

[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number*** *:* **SW2 – Cooling Water Outfall**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Temperature	Decrease of thermal load by a decrease in cooling water demand	N/A	N/A	N/A
Chlorine	Controlled Chlorine dosing	N/A	N/A	N/A

N/A: Not Applicable — No equipment

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Temperature	Continuous	Standard Equipment	In accordance with manufacturer's specifications
Chlorine	Continuous	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number*** *:* **SW3 – Foul Water Treatment System**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
BOD	Proprietary secondary treatment system	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	In accordance with manufacturer's specifications	Maintenance contract
Suspended Solids	As above	As above	As above	As above
Ammonia	As above	As above	As above	As above
Phosphorous	As above	As above	As above	As above

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
BOD	Bi-annual	Standard Equipment	In accordance with manufacturer's specifications
Suspended Solids	Bi-annual	As above	As above
Ammonia	Bi-annual	As above	As above
Phosphorous	Bi-annual	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number :*** **SW4 – Surface water run-off from the CCGT area**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
TPH	Oil interceptor	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	N/A	N/A
Suspended Solids	Silt Trap	As above	As above	As above

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Conductivity	Daily	Standard Equipment	In accordance with manufacturer's specifications
Suspended Solids	Daily	As above	As above
pH	Daily	As above	As above
TPH	Daily	As above	As above
BOD	Monthly	As above	As above
COD	Monthly	As above	As above
Ammonia (as N)	Monthly	As above	As above
Total Phosphorous	Monthly	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number :*** **SW12 – Surface water run-off from the CCGT area**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
TPH	Oil interceptor	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	N/A	N/A
Suspended Solids	Silt Trap	As above	As above	As above

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Conductivity	Daily	Standard Equipment	In accordance with manufacturer's specifications
Suspended Solids	Daily	As above	As above
pH	Daily	As above	As above
TPH	Daily	As above	As above
BOD	Monthly	As above	As above
COD	Monthly	As above	As above
Ammonia (as N)	Monthly	As above	As above
Total Phosphorous	Monthly	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

TABLE F.1(i): ABATEMENT / TREATMENT CONTROL

- ***Emission point reference number*** *:* **SW13 – Process waste water**

Control[1] parameter	Equipment [2]	Equipment maintenance	Equipment calibration	Equipment back-up
Ammonia	Controlled dosing and monitoring	Equipment will be routinely inspected and maintained as part of a planned preventive maintenance programme in accordance with manufacturer's specifications	In accordance with manufacturer's specifications	Maintenance supplies
Conductivity	As above	As above	As above	As above
Temperature	Continuous monitoring and aeration cooling	As above	As above	As above
pH	Continuous monitoring and pH control dosing	As above	As above	As above
Dissolved Oxygen	Continuous monitoring and aeration	As above	As above	As above
TOC	Controlled dosing and monitoring	As above	As above	As above
COD	As above	As above	As above	As above
BOD	As above	As above	As above	As above
Suspended Solids	Monitoring, agitator and settlement	As above	As above	As above
TPH	Oil / water interceptor	As above	As above	As above
Total Phosphorous (as P)	Controlled dosing and monitoring	As above	As above	As above
Toxicity	As above	As above	As above	As above

Control[1] parameter	Monitoring to be carried out[3]	Monitoring equipment	Monitoring equipment calibration
Flow	Continuous	Discharge line flowmeter	In accordance with manufacturer's specifications
Ammonia	Continuous	On-line analyser	As above
Conductivity	Continuous	As above	As above
Temperature	Continuous	As above	As above
pH	Continuous	As above	As above
Dissolved Oxygen	Continuous	As above	As above
TOC	Continuous	As above	As above
Total Phosphorous (as P)	Daily	As above	As above
BOD	Monthly	As above	As above
COD	Monthly	As above	As above
Suspended Solids	Monthly	As above	As above
Ammonia	Monthly	As above	As above
TPH	Monthly	As above	As above
Toxicity	As may be required	As above	As above

[1] List the operating parameters of the treatment / abatement system which control its function.
[2] List the equipment necessary for the proper function of the abatement / treatment system.
[3] List the monitoring of the control parameter to be carried out.

F.2 Emissions Monitoring and Sampling Points

Identify monitoring and sampling points and outline proposals for monitoring ***emissions****.*

Table F.2(i) should be completed (where relevant) for air emissions, for emissions to surface waters, for emissions to sewers, for emissions to ground, and for waste emissions. Where ambient environment monitoring is carried out or proposed, Table F.2(ii) should be completed as relevant for each environmental medium.
Include details of monitoring/sampling locations and methods.
Attachment N^{o} F.2 should contain any supporting information.

F.2.1 General

A traceable and transparent monitoring, sampling and reporting programme will be developed to ensure that emissions from the facility are within the relevant emission limit values and irregularities and malfunctions are detected, and corrective actions implemented as soon as practicable. The monitoring and sampling frequency implemented will be proportionate to the level of risk to the environment.

Monitoring and sampling points will be limited to emissions to atmosphere, emissions to surface water and noise.

F.2.2 Atmospheric Emissions Monitoring and Sampling Points

Natural gas and distillate are very clean fuels which allow practically complete combustion in gas turbine combustors. As CO is a product of incomplete combustion, the main atmospheric pollutant of concern for gas fired CCGT power plants is NO_x. NO_x will be controlled by employing low NO_x burners, additional NO_x suppression will be provided by water injection, while operating on distillate oil. The plant will normally operate on natural gas. The plant will only operate on distillate in the event of an interruption to gas supply and for short duration testing. Distillate will be limited to a maximum of 0.1% Sulphur.

Exhaust gases from the gas turbine will be emitted to atmosphere through the gas turbine new main stack, A2-1. The stack will incorporate an in-situ proprietary Continuous Emission Monitoring System, CEMS. The selection, installation, calibration, ongoing quality assurance and annual surveillance testing of the CEMS will be undertaken in accordance with *EN 14181 – Quality Assurance of Automated Measuring Systems* and all relevant standards referred to therein. The requirements of EN 14181 will be incorporated into the planned preventive maintenance programme (PPMP).
The CEMS will continuously monitor NO_x, CO, Temperature and O_2. Additional monitoring of SO_2 and Particulate Matter will be undertaken in accordance with the requirements of the EPA.

Minor and fugitive emissions from the facility are not considered to be significant. Therefore, it is not proposed to undertake additional atmospheric emissions monitoring for the minor and fugitive emission points identified in Attachment E.1 *Emissions to Atmosphere*. Figure F.2.2 illustrates the location of the monitoring point from the new stack.

TRUE NORTH

Great Island Power Station

No.	Main Emissions Points	N	E
A2-1	Gas Turbine Main Stack	114574.4	268907.2

Road

HFO STRIP TANK

Overhead Piperack 6m Clearance

LAYDOWN AREA

LAYDOWN AREA

CW OUTFALL

Security Fence

PIG TRAP

INSTRUMENT HOUSE

METERS

ANALYSER KIOSK

HEAT EXCHANGER

BOILER HOUSE

REGULATION HOUSE

Mud

Notes

1. ORDNANCE SURVEY IRELAND LICENCE NO. EN0034509
   © ORDNANCE SURVEY IRELAND/GOVERNMENT OF IRELAND
2. ALL CO-ORDINATES SHOWN RELATE TO IRISH NATIONAL GRID CO-ORDINATES.
3. ALL SITE LEVELS REFER TO MEAN SEA LEVEL VERTICAL DATUM AT POOLBEG.
4. GENERAL SITE LEVEL IS +7.00M O.D.

Legend:

Boundary for New Power Station

1 GAS TURBINE AND STEAM TURBINE BUILDING
2 GAS TURBINE
3 STEAM TURBINE
4 AIR INLET FILTER TO GAS TURBINE
5 ELECTRICAL ANNEX & CONTROL ROOM
6 HEAT RECOVERY STEAM GENERATOR (HSRG)
7 CCW SKID
8 OIL SEPERATOR (RELOCATED)
9 GAS FUEL TREATMENT SKID
10 DEMINERALISED WATER SUPPLY PUMPS (NOX ABATEMENT)
11 GENERATOR TRANSFORMER
12 UNIT AUXILIARY TRANSFORMER
13 NATURAL GAS COMPOUND AGI
14 DISTILLATE OIL STORAGE TANK
15 GAS COMPRESSOR
16 DEMIN WATER STORAGE TANK (1 x 6,000m³)
17 WATER TREATMENT PLANT BUILDING
18 MAIN STACK
19 FIRE PUMP HOUSE (INSIDE EXISTING BUILDING)
20 DISTILLATE FUEL OIL FORWARDING PUMP SKID
21 CW CULVERT
22 GAS MAIN
23 BOILER FEED WATER PUMPS
24 FIN FAN COOLER
25 RAILS IN ROAD FOR TRANSFORMER REMOVAL
26 CHEMICAL INJECTION SKID
27 CAUSTIC STORAGE TANK WITH BUND
28 ACID STORAGE TANK WITH BUND
29 GAS TURBINE OILY WATER DRAIN TANK
30 STARTING TRANSFORMER
31 EXCITATION TRANSFORMER
32 AUXILIARY TRANSFORMER
33 SEWAGE TREATMENT PLANT
34 BOILER WASTE WATER DRAIN TANK
35 N2/H2/CO2 STORAGE
36 PROCESS WATER DISCHARGE PIT
37 BLOWDOWN VESSEL
38 AUXILIARY BOILER
39 AUXILIARY BOILER FLUE STACK
40 CONTINUOUS EMMISSION MONITORING (CEM) SYSTEM
41 CONDENSATE POLISHER
42 DISTILLATE OIL SUPPLY PIPE TO GENERATOR
43 HFO FILLING PIPE IN CONCRETE TRENCH
44 DISTILLATE OIL FILLING PIPE IN CONCRETE TRENCH

0 25m 50m

Scale 1:500

Rev	Date	Drawn	Description	Ch'k'd	App'd
P1	07/05/10	CC	Issued for IPPCL	KMc	DMc

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Title

Combined Cycle Gas Turbine
Great Island, Co. Wexford

Monitoring of Atmospheric Emissions

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Drawn	C. Cunningham		Coordination	D. McRandal	
Dwg.Chk.	K. McGarvey		Approved	D. McRandal	

Scale 1:500

Project 257554

CAD file Figure F.2.2

Status APR

Drawing No Figure F.2.2

Rev P1

TABLE F.2(i): EMISSION MONITORING AND SAMPLING POINTS

Emission point reference number *:* **A2-1 (New CCGT Main Stack firing on natural gas)**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
NO_x	Continuous	Accesible	Continuous	Proprietary CEMS
CO	Continuous	As above	As above	As above
Temperature	Continuous	As above	As above	As above
O_2	Continuous	As above	As above	As above
SO_2	Annually	As above	Standard Method	Standard Method
Particulate Matter	Annually	As above	As above	As above

Emission point reference number *:* **A2-1 (New CCGT Main Stack firing on distillate oil)**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
NO_x	Continuous	Accesible	Continuous	Proprietary CEMS
CO	Continuous	As above	As above	As above
Temperature	Continuous	As above	As above	As above
O_2	Continuous	As above	As above	As above
SO_2	*Annually	As above	Standard Method	Standard Method
Particulate Matter	*Annually	As above	As above	As above

*In conjunction with distillate oil testing regime

F.2.3 Effluent Emission Monitoring and Sampling Points

The operation of the power plant is anticipated to produce the following waste water streams:

- Process waste water
- Surface water run-off
- Foul waste water
- Cooling water

(i) Process waste water

Process wastewater comprising boiler blowdown, water treatment plant effluent discharge, effluent from the demineralisation plant, condensate drains and occasional flows from leaks and sampling, will be discharged to the estuary post treatment and monitoring within the limits set in the IPPC licence.
Ammonia, Dissolved Oxygen, pH, Conductivity, Total Organic Carbon (TOC), and temperature will be continuously monitored. The automated system will only discharge if these parameters are within the IPPC licence limits.
Discharge volumes will be measured via a flowmeter installed on the discharge line. In addition, the outlet of the process waste water discharge tank will be fitted with an automatic sampler capable of taking 24 hr composite samples. An on-site laboratory will also be provided to facilitate additional monitoring on site, in accordance with EPA requirements.

(ii) Surface water run-off

Rainfall from hard standing areas will drain to the estuary via a Class 1 bypass oil interceptor and silt trap unit, prior to discharge via existing Outfall SW4 and SW12. Surface water runoff from the AGI area, and its access road, will also be conveyed by a new collection system and treated via a silt trap unit and bypass oil interceptor prior to discharge via existing Outfall SW1.

(iii) Foul waste water

Foul waste water, from potable use on site, will be treated in a proprietary secondary treatment system. This treated effluent will then be monitored and discharged to the estuary via SW3.

(iv) Cooling water

Cooling water will be abstracted from the Barrow Estuary utilising the existing water intake and outfall systems. At monitoring point SW2, temperature and Chlorine will be continuously monitored.

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : **SW1 - Surface water run-off from the AGI area**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
TPH	Daily	Accessible	Grab sample / Visual inspection	Sample and inspect for colour and odour
Suspended Solids	Daily	As above	As above	As above
pH	Daily	As above	As above	Standard method
Conductivity	Daily	As above	24 hour composite flow	As above
BOD	Monthly	As above	As above	As above
COD	Monthly	As above	As above	As above
TDS	Monthly	As above	As above	As above
Ammonia (as N)	Monthly	As above	As above	As above
Total Phosphorous (as P)	Monthly	As above	As above	As above

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : **SW2 - Cooling water outfall**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
pH	Continuous	Accessible	Temperature probe	Sample and automatic record
Chlorine	Continuous	As above	Standard Method	Standard Method

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : **SW3 – Foul Water Treatment System**

Parameter	*Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
BOD	Bi-annual	Accessible	Standard Method	Standard Method
Suspended Solids	Bi-annual	As above	As above	As above
Ammonia (as N)	Bi-annual	As above	As above	As above
Total Phosphorous (as P)	Bi-annual	As above	As above	As above

- Treated foul water from the proprietary treatment system will discharge into the process waste water discharge tank where it will undergo monitoring and sampling in combination with the process wastewater prior to discharge. Monitoring of the effluent from the proprietary system will be undertaken on a bi-annual basis as a quality control check on the effectiveness of the system.

- **TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS** (1 table per monitoring point)

Emission Point Reference No. : **SW4 - Surface water run-off from the CCGT area**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
TPH	Daily	Accessible	Grab sample / Visual inspection	Sample and inspect for colour and odour
Suspended Solids	Daily	As above	As above	As above
pH	Daily	As above	As above	Standard method
Conductivity	Daily	As above	24 hour composite flow	As above
BOD	Monthly	As above	As above	As above
COD	Monthly	As above	As above	As above
TDS	Monthly	As above	As above	As above
Ammonia (as N)	Monthly	As above	As above	As above
Total Phosphorous (as P)	Monthly	As above	As above	As above

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : **SW12 - Surface water run-off from the CCGT area**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
TPH	Daily	Accessible	Grab sample / Visual inspection	Sample and inspect for colour and odour
Suspended Solids	Daily	As above	As above	As above
pH	Daily	As above	As above	Standard method
Conductivity	Daily	As above	24 hour composite flow	As above
BOD	Monthly	As above	As above	As above
COD	Monthly	As above	As above	As above
TDS	Monthly	As above	As above	As above
Ammonia (as N)	Monthly	As above	As above	As above
Total Phosphorous (as P)	Monthly	As above	As above	As above

TABLE F.2(i) : EMISSIONS MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Emission Point Reference No. : **SW13 – Process Waste Water**

Parameter	Monitoring frequency	Accessibility of Sampling Points	Sampling method	Analysis method/ technique
Flow	Continuous	Accessible	Not Applicable	Discharge line flowmeter
Ammonia	Continuous	As above	On-line monitoring and automatic sampler	On-line monitoring and automatic sampler
Conductivity	Continuous	As above	As above	As above
Temperature	Continuous	As above	As above	As above
pH	Continuous	As above	As above	As above
Dissolved Oxygen	Continuous	As above	As above	As above
TOC	Continuous	As above	As above	As above
Total Phosphorous (as P)	Daily	As above	24 hour composite flow	Standard Method
BOD	Monthly	As above	As above	As above
COD	Monthly	As above	As above	As above
Suspended Solids	Monthly	As above	As above	As above
Ammonia	Monthly	As above	As above	As above
TPH	Monthly	As above	As above	As above
Toxicity	As may be required	As above	As above	As above

F.2.4 Ambient Noise Monitoring and Sampling Points

Annual Noise Surveys have been carried out up to now for the existing HFO power plant as per current IPPCL requirement to demonstrate that noise levels remain below the applicable limits: 55dB (A) Daytime and 45dB (A) Night time. However, noise measurement locations are not specified in the IPPCL but have typically been the following:

- NML1 — Main Gate: monitoring point located next to the main gate beside access road.
- NML2 — Jetty Gate: monitoring point located on hard ground on the jetty (off-shore), on the main central platform.
- NML3 — Cooling Water Outfall: monitoring point located beside boundary, approximately 30 meters in front of the bridge on water outfall canal.
- NML4 — Matter and Platt: monitoring point located on hard ground, approximately 100 meter to the west of the storage tank farm.

Existing Noise Monitoring Locations	Ref.	Irish Grid Reference	
		Northing	Easting
Main Gate	NML1	268573	114825
Jetty Gate	NML2	268655	114508
Cooling Water Outfall	NML3	269001	114599
Matter and Platt (beside 110kv substation)	NML4	268574	114713

Table F.2.1: Existing Noise Monitoring Locations

Current conditions for the HFO plant in terms of Noise emissions require compliance with the current IPPCL P0606-02. Conditions for the new CCGT in terms of noise limits and frequency of the noise surveys will be set by the EPA through the reviewed IPPCL.

Given that the proposed development will be located inside the boundaries of the existing facility, Endesa Ireland Ltd. will comply with the conditions set out in the current IPPCL.

Details of the proposed ambient monitoring points are provided in Table F.2(ii) hereunder.

TABLE F.2(ii): AMBIENT ENVIRONMENT MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Monitoring Point Reference No : **NML 1**

Parameter	Monitoring frequency	Accessibility of Sampling point	Sampling method	Analysis method / technique
Noise	Annual	Accessible	Standard Equipment	Standard Monitoring Techniques

Monitoring Point Reference No : **NML 2**

Parameter	Monitoring frequency	Accessibility of Sampling point	Sampling method	Analysis method / technique
Noise	Annual	Accessible	Standard Equipment	Standard Monitoring Techniques

TABLE F.2(ii): AMBIENT ENVIRONMENT MONITORING AND SAMPLING POINTS (1 table per monitoring point)

Monitoring Point Reference No :**NML 3**

Parameter	Monitoring frequency	Accessibility of Sampling point	Sampling method	Analysis method / technique
Noise	Annual	Accessible	Standard Equipment	Standard Monitoring Techniques

Monitoring Point Reference No :**NML 4**

Parameter	Monitoring frequency	Accessibility of Sampling point	Sampling method	Analysis method / technique
Noise	Annual	Accessible	Standard Equipment	Standard Monitoring Techniques

F.3 Tabular Data on Monitoring and Sampling Points

Applicants should submit the following information for each monitoring and sampling point:

Point Code	***Point Type***	***Easting***	***Northing***	***Verified***	***Pollutant***
Provide label ID's assigned in section F3	*M=Monitoring S=Sampling*	*6E-digit GPS Irish National Grid Reference*	*6N-digit GPS Irish National Grid Reference*	*Y = GPS used N = GPS not used*	*e.g. SO_2, HCl, NH_3*

An individual record (i.e. row) is required for each monitoring and sampling point. Acceptable file formats include Excel, Access or other upon agreement with the Agency. A standard Excel template can be downloaded from the EPA website at www.epa.ie. This data should be submitted to the Agency on a separate CD-Rom containing sections B.2, E.6 and F.3.

Point source monitoring/sampling refers to monitoring from specific emission points (e.g. from a boiler stack or outlet from a wastewater treatment plant). Examples of ambient monitoring includes monitoring of ambient air quality (e.g. boundary or off-site) or monitoring of river quality upstream/downstream of an effluent discharge.

F.3.1 Monitoring and Sampling Point data

Tabular data on monitoring and sampling points is submitted in Excel format on a separate CD-Rom. The name of the Excel file is "Attachment No. F - B2_E6_F3.xls".

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Attachment H

H. Materials Handling

H.1 Raw Materials, Intermediates, Products Handling

All materials should be listed in Tables G.1(i) and G.(ii) of ***Section G****.*

Details of the storage conditions, location within the site, segregation system used and transport systems within the site should be outlined here. In addition, information relating to the integrity, impermeability and recent testing of pipes, tanks and bund areas should be outlined.

H.1 Raw Materials and Product Handling

As described in Attachment G, raw materials will comprise both types:

- Primary Raw Materials (water, natural gas and distillate) and
- Secondary Raw Materials (conditioning chemicals, laboratory smalls, coolants and cleaning products).

Site activities will only generate electricity. No intermediate products will be produced.

H.1.1 General Provisions

Packaging, containment and transportation of hazardous chemicals and wastes will be undertaken in accordance with the *Carriage of Dangerous Goods by Road Regulations, 2007* and the *International Maritime Dangerous Goods (IMDG) Code*, as appropriate. Drums and IBC's (Intermediate Bulk Container) will be offloaded from delivery trucks by suitably trained personnel using appropriately rated and maintained equipment. Forklifts and/or trolleys will be used to transport drums and IBC's around the site. The containers will be securely fixed to the forklift/trolley using pallets or drum clamps. Chemical and hazardous waste stores will be segregated in accordance with *HSG 71 Chemical Warehousing - The Storage of Packaged Dangerous Substances.*

Site specific operating procedures will be developed for the use, handling and disposal of raw materials and waste. Only appropriately trained personnel will be authorised to handle hazardous materials on site. All chemicals stored will be subject to a COSHH assessment and compliance with REACH.

All tanks, bunds and pipe networks will be designed and tested in accordance with BAT and the following standards and guidelines, as appropriate:

• *BS EN 14015 Specification for the design and manufacture of site built, vertical cylindrical, flat-bottomed, above ground, welded, steel tanks for the storage of liquids at ambient temperature and above;*
• *CIRIA 163 Construction of bunds for oil storage tanks;*
• *BS8007:1987, Code of practice for design of concrete structures for retaining aqueous liquid;* and
• *IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities.*

H.1.2 Primary Raw Materials

(i) Water:

Public water supply

The site will connect to the local Council Water System via the onsite (existing) reservoir, providing water both for potable use and for process water.

For the process water, raw feedwater will be stored on site in the reservoir of up to 9,500m3 capacity located to the north of the site. The tank will also hold a supply of water for fire fighting purposes in addition to a separate 500m^3 tank.

Water will be pumped from the reservoir to the demineralisation plant for treatment. Demineralised water will be pumped from the plant to the demineralised water storage tank with a capacity of 6,000m^3. Raw and demineralised water will always have separate dedicated pipework.

The proposed CCGT will require 7.41m^3/hr during normal operation which is approximately 37% of the current demand of 20.22m^3/hr with HFO plant. In addition Endesa Ireland Ltd. are upgrading the local water scheme as part of a special planning contribution (complete new pipe eliminating any leaks), therefore bearing in mind the existing water system has the capacity to accommodate the existing plant and considering the water savings with the new CCGT and the improvement in water leakages (if any), the impact on the local water scheme will be much less with the new CCGT.

Cooling water supply

The proposed CCGT power plant will require a supply of cooling water from the estuary. This water will be sourced through the existing cooling water intake channel and discharged via the existing cooling water outfall channel, the new plant therefore replacing the existing plant. There will be no infrastructural works required in the estuary and the cooling water requirement will be significantly less than the current plant.

(ii) Natural Gas:

Natural gas will be piped directly to the site via the Gaslink/Bord Gáis Network trough a new gas line developed for the proposed CCGT. The gas will not be stored on site. An Above Ground Installation (AGI), located to the east of the site, will regulate the condition of the gas imported. The stainless steel gas pipe network will be welded to prevent leaks. Lines will be fitted with pressure relief valves, pressure/temperature controls, alarms and shut-down valves. Emergency shut-down valves on the internal gas pipeline will ensure complete shut-down within 60 seconds of leak detection. An isolation valve within the AGI will also shut off supply to the site on demand.

The gas compressor (if required) will be fitted with CO2 suppressors and gas detection systems.

(iii) Distillate

As per CER requirements, Distillate (distillate oil) will be transported to site via ship and the current on-site operational jetty to one of the existing storage tanks. A quantity of 11,000 m^3 will be stored in one of the current 17,000m^3 tanks located to the North east of the site as explained in the QRA report in Section B. In order to prevent escape of distillate in the unlikely event of a catastrophic failure of the tanks, existing containment systems are provided and will be upgraded as per QRA for planning permission. The containment system will capture any distillate overtopping. The bund is fitted with draining facilities to enable drainage of collected storm water. The storm water will pass through a silt trap and hydrocarbon interceptor prior to discharge. The bunds are fitted with ramps to allow access by the emergency services and maintenance personnel.

H.1.3 Secondary Raw Materials

(i) Conditioning Chemicals and Lab Smalls

Conditioning chemicals and laboratory smalls will be stored in a chemical store within the water treatment plant. The storage room will be provided with appropriate ventilation and temperature control. Drums and IBC's will be stored on drip trays/spill pallets. The store will be fully enclosed containing any spills within. A spill kit will be located in close proximity to the chemical store. Laboratory chemicals will be stored in relatively small quantities. Only experienced and trained personnel will be permitted access to the chemical store on site.

As required, conditioning chemicals will be transferred from the water treatment plant to replenish the dosing tanks located within the turbine hall. The transfer route will be kept clear of all obstacles to allow the safe transfer of chemicals. Dosing tanks will be fitted with level indicators and located within bunds. The contents of the drums will be transferred to the dosing tanks using dedicated filling pumps. Transfer of chemicals will be undertaken by trained personnel only. The dosing tank level indicators and bunds will be subject to regular inspections.

Additional water treatment chemicals, such as Sulphuric Acid and Sodium Hydroxide, will be transferred by road tanker to dedicated 33m^3 capacity bunded storage tanks adjacent to the water treatment plant. The chemicals will be transferred from the tanks to the water treatment plant via pipeline. The Sulphuric Acid tank will be fitted with a vapour trap. Gases will vent through the trap media and exit the tank via a vent.

Hydrogen will be stored in UN approved cylinders, in a designated area, within the turbine hall. Deliveries of Hydrogen will be supervised. The hydrogen system will be earthed and connections will be carried out by trained personnel only. The cylinders will be fitted with corrosion resistant leak proof valves. Leaks of Hydrogen and the ingress of air into the generator cooling system will be prevented through the use of seal oil at a pressure higher than that of the Hydrogen.

(ii) Cleaning Products

Cleaning products will be of a water based biodegradable nature wherever possible. A hazardous detergent is however required for compressor cleaning. Hazardous compressor cleaning products will be segregated in a locked cabinet with limited access to prevent misuse.

Oils and greases, for general maintenance use, will be stored in drums within bunds in the main stores building.

H.1.4 Switchyard/ Substation

The proposed facility is an electricity generating plant and therefore the electricity generated must be exported to the nation grid distribution system. The electricity generated will be fed to a generator transformer where the voltage will be stepped up to 220 kV and transferred via an underground cable to the onsite existing switchyard on the north of the site.

The design, layout and control of the electrical plant in the switchyard are the responsibility of EirGrid and ESB Networks.

H.2 Arrangements for Recovery / Disposal of Solid and Liquid Wastes

Describe the arrangements for the recovery or disposal of solid and liquid wastes accepted into or generated by the installation/facility.

For each waste material, give full particulars of:

(a) Name

(b) Description & nature of waste

(c) Source

(d) Where stored and integrity/impermeability of storage areas

(e) Amount (m^3) and tonnage

(f) Period or Periods of generation

(g) Analysis (include test methods and Q.C)

(h) European Waste Catalogue Code

(i) Waste Category per EC Reg 1774/2002/EC where relevant

Where any waste would be classified as Hazardous Waste as defined in the Waste Management Acts, 1996 to 2003, this should be made clear in the information provided.

Summary Tables H.1(i) and H.1(ii) should also be completed, as appropriate, for each waste. The licence/permit register number of the waste collection agent or disposal/recovery operator should be supplied as well as the expiry date of the relevant permits.

Supporting information should form ***Attachment Nº H.2***

H.2.1 Waste Arisings

Details of both hazardous and non-hazardous waste arisings are provided in Table H.2.1(i) and H.2.1(ii). The details provided are indicative only. However, they are based on similar plants (CCGT technology) of similar size (in terms of capacity installed, MW), in Ireland and Spain. It is therefore not anticipated that the actual waste arisings will differ significantly from those provided in this Application.

A definitive list of anticipated waste arisings and alternative waste contractors can be provided to the EPA, on request, once the CCGT plant becomes operational.

Endesa Ireland Ltd. currently have and will always contract waste management services from registered companies which have their corresponding permits (collection, transportation and disposal) in place and preferably having certifications (ISO14001 and OHSAS 18001) and providing recycling options.

TABLE H.1(i): WASTE - Hazardous Waste Recovery / Disposal

Waste Material	EWC Code	Main Source[1]	Quantity		On-site Recovery/Disposal[2]	Of-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes/ month	m^3/month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Waste Hydraulic Oil	13 01 11	Plant Equipment	<0.05	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois. (Or other appropriately permitted licensed contractor)	N/A
Lubricating Oils	13 02 08	Plant Maintenance	<0.05	N/A	N/A	As above	N/A
Turbine Control Oil/ Lubricating Oil	10 03 10	Plant Maintenance Very infrequent, circa every 7 years	<0.05	N/A	N/A	As above	N/A
Interceptor Sludge	13 05 03	Oil/Water Interceptor	<0.1	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd Portlaoise , Co Laois (Or other appropriately

Waste Material	**EWC Code**	**Main Source**[1]	**Quantity**		**On-site Recovery/Disposal**[2]	**Of-site Recovery, reuse or recycling**	**Off-site Disposal**
			Tonnes/ month	**m^3/month**	**(Method & Location)**	**(Method, Location & Undertaker)**	**(Method, Location & Undertaker)**
							permitted licensed contractor)
Oily Water from Oil/Water Separators	13 07 01	Fuel	<0.5	N/A	N/A	N/A	As above
Waste distillate oil	13 07 01	Fuel	<0.5	N/A	N/A	*Recovery* Enva Ireland Ltd Portlaoise, Co Laois (Or other appropriately permitted licensed contractor)	N/A
Hazardous Filters and centrifuge waste	15 02 02	Plant Maintenance	<0.01	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaois, Co. Laois (Or other appropriately permitted licensed

Waste Material	**EWC Code**	**Main Source[1]**	**Quantity**		**On-site Recovery/Disposal[2]**	**Of-site Recovery, reuse or recycling**	**Off-site Disposal**
			Tonnes/ month	**m^3/month**	**(Method & Location)**	**(Method, Location & Undertaker)**	**(Method, Location & Undertaker)**
							contractor)
Contaminated Rags and Wipes	15 02 03	Plant Maintenance	<0.01	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)
Empty Hazardous Containers	15 01 10	Process Chemical Waste	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	N/A
Halogenated Organic Laboratory Solvent	07 07 03	Laboratory Use	<0.01	N/A	N/A	As above	N/A

Waste Material	**EWC Code**	**Main Source**[1]	**Quantity**		**On-site Recovery/Disposal**[2]	**Of-site Recovery, reuse or recycling**	**Off-site Disposal**
			Tonnes/ month	**m^3/month**	**(Method & Location)**	**(Method, Location & Undertaker)**	**(Method, Location & Undertaker)**
General Lab Waste	15 05 06	Laboratory Use	<0.001	N/A	N/A	As above	N/A
Waste Acid	06 01 01	pH Neutralisation	<0.01	N/A	N/A	As above	N/A
Waste Alkali	06 02 04	pH Neutralisation	<0.01	N/A	N/A	As above	N/A
Compressor Cleaning Waste	10 01 22	Plant Maintenance	<1.0	N/A	N/A	As above	N/A

TABLE H.1(ii) WASTE - Other Waste Recovery/Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Waste Hydraulic Oil	13 01 11	Plant Equipment	<0.05	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois. (Or other appropriately permitted licensed contractor)	N/A
Lubricating Oils	13 02 08	Plant Maintenance	<0.05	N/A	N/A	As above	N/A
Turbine Control Oil/ Lubricating Oil	10 03 10	Plant Maintenance Very infrequent, circa every 7 years	<0.05	N/A	N/A	As above	N/A
Interceptor Sludge	13 05 03	Oil/Water Interceptor	<0.1	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd Portlaoise , Co Laois (Or other appropriately permitted licensed contractor)

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Oily Water from Oil/Water Separators	13 07 01	Fuel	<0.5	N/A	N/A	N/A	As above
Waste distillate oil	13 07 01	Fuel	<0.5	N/A	N/A	*Recovery* Enva Ireland Ltd Portlaoise, Co Laois (Or other appropriately permitted licensed contractor)	N/A
Hazardous Filters and centrifuge waste	15 02 02	Plant Maintenance	<0.01	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaois, Co. Laois (Or other appropriately permitted licensed contractor)
Contaminated Rags and Wipes	15 02 03	Plant Maintenance	<0.01	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
							appropriately permitted licensed contractor)
Empty Hazardous Containers	15 01 10	Process Chemical Waste	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	N/A
Halogenated Organic Laboratory Solvent	07 07 03	Laboratory Use	<0.01	N/A	N/A	As above	N/A
General Lab Waste	15 05 06	Laboratory Use	<0.001	N/A	N/A	As above	N/A
Waste Acid	06 01 01	pH Neutralisation	<0.01	N/A	N/A	As above	N/A
Waste Alkali	06 02 04	pH Neutralisation	<0.01	N/A	N/A	As above	N/A
Compressor	10 01 22	Plant	<1.0	N/A	N/A	As above	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Cleaning Waste		Maintenance					
Contaminated Protective Personal Equipment	15 02 02	Plant Maintenance	<0.005	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)
Batteries	20 01 33	Switchgear (Changed every 10-15 years)	<0.001	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)
Fluorescent light replacement	20 01 21	General Site Use	<0.005	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Waste Electrical Electronic Equipment	20 01 13	General Site Use	<0.1	N/A	N/A	*Recovery* WEEE Recycling, Tullamore, Co Offlay (Or other appropriately permitted licensed contractor)	N/A

[1] A reference should be made to the main activity / process for each waste.
[2] The method of disposal or recovery should be clearly described and referenced to Attachment H.1

Table H.2.1(ii) Waste – Other Waste Recovery / Disposal

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
Non-hazardous filters	15 02 03	Plant Maintenance	<0.01	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
							appropriately permitted licensed contractor)
Empty Non Hazardous Containers	15 01 06	Process Chemical Waste	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	N/A
General Laboratory Waste	16 05 09	Laboratory Use	<0.0001	N/A	N/A	As above	N/A
Spent Ion Exchange Resin	19 09 05	Water Treatment	<0.001	N/A	N/A	As above	N/A
Process Waste Water Sludge	10 01 21	Process Water	<0.5	N/A	N/A	As above	N/A
Personal Protective Equipment	15 02 03	Plant Maintenance	<0.005	N/A	N/A	As above	N/A
Scrap Metal	20 01 40	Plant Maintenance	<0.001	N/A	N/A	*Recovery* Enva Ireland Ltd,	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
						Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	
Wooden Pallets	15 01 03	Delivery and Storage	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	
Municipal waste (canteen waste, office paper, etc)	20 03 01	General Site Use (Office, canteen, etc)	<1.0	N/A	N/A	N/A	*Disposal* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)
Paper and Cardboard	20 01 01	Office Waste/Packaging	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other	N/A

Waste material	EWC Code	Main source[1]	Quantity		On-site recovery/disposal[2]	Off-site Recovery, reuse or recycling	Off-site Disposal
			Tonnes / month	m^3 / month	(Method & Location)	(Method, Location & Undertaker)	(Method, Location & Undertaker)
						appropriately permitted licensed contractor)	
Plastic	20 01 39	Packaging	<0.1	N/A	N/A	As above	N/A
Waste Electrical Electronic Equipment	20 01 13	General Site Use	<0.1	N/A	N/A	*Recovery* Enva Ireland Ltd, Portlaoise, Co. Laois (Or other appropriately permitted licensed contractor)	N/A

[1] A reference should be made to the main activity/process for each waste
[2] The method of disposal or recovery should be clearly described and referenced to Attachment H.1

H.2.2 Waste Storage and Generation

Waste will be stored in UN-approved containers, as required. Containers will be inspected regularly to ensure they have not been damaged or become degraded. All drums will be secured to pallets for uploading. All liquid waste drums will allow 10% ullage to prevent doming.

Hazardous and non-hazardous waste will be segregated and clearly labelled. All hazardous wastes will be stored in accordance with *HSG 71 Chemical Warehousing - The Storage of Packaged Dangerous Substances.*
Bund integrity will be monitored regularly. Integrity testing will be undertaken in accordance with *CIRIA 163 Construction of bunds for oil storage tanks* and *IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities*, EPA (2004).
All storm water runoff from hardstanding areas will be directed through an oil/water interceptor and silt trap prior to discharge. The fully enclosed chemical storage room will be fully contained, spills and leaks will be cleaned by suitably qualified personnel using absorbent material which will be disposed of off-site. All drums will be stored on drip trays/spill pallets. Spill kits will be provided in all waste storage areas containing liquids.

Non-hazardous waste, destined for off-site national landfills, will be transferred from various wheelie bins located around the facility to a skip located beside the administration building. Putrescible wastes will be covered to prevent the escape of litter and odour and access by vermin. Cardboard, paper and plastic, destined for recycling, will be collected from various recycling bins located around the facility and transferred to a wheelie bin (or skip, as required) located in the main car park for collection.

Storage arrangements, and periods of waste generation, are described in Tables H.2.2(i) and H.2.2(ii) hereunder:

Table H.2.2(i) Hazardous Waste Storage and Generation

- Generation Period - Continuous = while the CCGT is operating
- Container Type = always subject to the specific waste management contractor

Hazardous Waste Type	Container Type	Location	Period(s) of Generation
Waste Hydraulic Oil	IBC	Maintenance Compound	Periodic
Lubricating Oils	IBC	Maintenance Compound	Periodic
Interceptor Sludges	Removed Directly form Oil/Water Interceptor	Adjacent to Discharge Tank, AGI and Transformers	Periodic
Residual Oily Water from Oil/Water Separators	Removed Directly from Oil/Water Interceptor	Adjacent to Discharge Tank, AGI and Transformers	Periodic
Waste Fuel Oil and Distillate	Tank	Maintenance Compound	Periodic

Hazardous Fitlers	Drum	Maintenance Compound	Periodic
Empty Hazardous Containers	Secured on Pallets	Maintenance Compound	Periodic/Continuous
Halogenated Organic Laboratory Solvent	Drum	Water treatment plant, chemical storage room	Continuous
Non - Halogenated Organic Laboratory Solvent	Drum	Water treatment plant, chemical storage room	Continuous
General Laboratory Waste	Drum	Water treatment plant, chemical storage room	Periodic/Continuous
Waste Acid	Drum	Water treatment plant, chemical storage room	Continuous
Waste Alkali	Drum	Water treatment plant, chemical storage room	Continuous
Compressor Cleaning Waste	Mobil Tank	Maintenance Compound	Periodic/Continuous
Contaminated Personal Protective Equipment	Drum	Water treatment plant, chemical storage room	Continuous
Batteries	Sealed Container (When required)	Outside Battery Room	Periodic
Fluorescent Tubes	Bin/Container	Maintenance Compound	Periodic
Waste Electrical Electronic Equipment	Bin/Container (When required)	Maintenance Compound	Periodic

Table H.2.2(ii) Non-hazardous Waste Storage and Generation

Non-hazardous Waste Type	**Container Type**	**Location**	**Period(s) of Generation**
Non-hazardous Filters	Drum	Maintenance Compound	Periodic
Empty Non-hazardous Containers	Skip	Maintenance Compound	Continuous
General Laboratory Waste	Drum	Water treatment plant, chemical storage room	Periodic
Spent Ion Exchange Resin	Drum	Water treatment plant, chemical storage room	Periodic
Process Wastewater Sludge	Process Discharge Tank	Maintenance Compound	Continuous
Personal Protective	Drum	Water treatment	Continuous

Equipment		plant, chemical storage room	
Scrap Metal	Skip	Maintenance Compound	Periodic
Wooden Pallets	Skip	Maintenance Compound	Periodic
Municipal waste (canteen waste, office paper, etc)	Skip	Beside Administration Building	Continuous
Paper and Cardboard	Bin/Skip (as required)	Beside Administration Building	Continous
Plastic	Bin/Skip (as required)	Beside Administration Building	Continous
Waste Electrical Electronic Equipment	Bin/Container (When required)	Maintenance Compound	Periodic

It is anticipated that approximately 60% of non-hazardous waste arisings will be recovered/recycled.
Waste audits will be undertaken periodically (external and internal).
If identified, opportunities for waste prevention, minimisation and additional recovery will be incorporated into the EMS environmental annual programmes.

H.2.3 Waste Collection Agents

Table H.2.3(i) hereunder provides an indicative list of proposed waste facilities and contractor permits/licences in place.

Table H.2.3(i) Waste collection potential Agents

Operator	Facility Number	EPA Waste Permit/Licence	Collection Permit Number
Enva Ireland Ltd, Portlaoise, Co. Laois	W0184-01	W0145-01 W0145-02 W0184-01	WCP-DC-08-1116-01
Rilta, Rathcoole, Co. Dublin (example of other appropriately licensed contractor)	W0192-02	W0192-01 W0192-02 W0192-03 W0185-01	WCP-DC-09-1192-01

Alternative or additional waste contractors may be appointed once the site becomes operational. These will be verified and agreed in advance of CCGT operation with the EPA.
Copies of all waste contractors authorisations and permits (and certifications when available) will be held on site and updated as required.

All waste arisings will be fully characterised prior to leaving the site. The parameters tested, if required, will be waste specific and determined in consultation with the waste contractor. Leachibility testing will be undertaken for sludge type wastes as required. All waste movements will be controlled in accordance with the appropriate transport and environmental legislation.

H.3 Waste Disposal by On-site Landfilling

For wastes to be disposed of by landfilling on-site, full details of the disposal site should be submitted (to include inter alia, site selection procedures, location maps, (no larger than A3) geology, hydrogeology, operational plan, containment, gas and leachate management, post-closure care).

Supporting information should form ***Attachment Nº H.3.***

H.3.1 On-Site Landfilling

No waste (neither non-hazardous nor hazardous) will be landfilled on-site. There are two capped areas in existence on the site and these are monitored per the current IPPC licence P0606-02. These areas were constructed by the ESB in the past and are located out of the new CCGT layout. The proposed development will not in any way impact on these areas.

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Attachment G

G. Resource Use and Energy Efficiency

Give a list of the raw and ancillary materials, substances, preparations, fuels and energy which will be produced by or utilised in the activity.

The list(s) given should be very comprehensive, all materials used, fuels, intermediates, laboratory chemicals and product should be included.

Particular attention should be paid to materials and product consisting of, or containing, dangerous substances as described in the EU (Classification, Packaging, Labelling and Notification of Dangerous Substances) Regulations 1994 [SI 77/94]. The list must classify these materials in accordance with Article 2 of these Regulations, and must specify the designated Risk Phrases (R-Phrases) of each substance in accordance with Schedule 2 of the Regulations.

Tables G.1(i) and G.1(ii) must be completed. Copy as required.

Supporting information should be given in **Attachment Nº G.**

G.1 Resource Use

A list of raw and ancillary materials is provided in Table G.1 (i). The data provided are indicative only. Raw material selection will ultimately be dependant on plant supplier specifications however it is not anticipated that the final list will deviate significantly from that provided. The characteristics of the materials listed are based on publicly available Material Safety Data Sheets (MSDS).

G.1.1 Primary Raw Materials

Primary raw materials for use in the proposed power plant include natural gas, distillate oil and water.

Natural gas is a clean fuel resulting in negligible emissions of Particulate Matter and Sulphur Dioxide. The main atmospheric pollutants relating to natural gas firing are therefore Nitrogen Oxides (NO_x).

Although the CCGT will normally be fuelled by natural gas, distillate oil storage and pumping facilities will also be provided. Distillate oil will be limited to a Sulphur content of 0.1%. The plant will only operate on distillate in the event of an interruption to gas supply and for short duration testing, as required by CER and EirGrid.

Raw untreated water, sourced from the Wexford County Council public supply, will be stored in the existing 9,500 m^3 service reservoir prior to treatment in the water treatment plant. The reservoir also holds capacity for fire fighting purposes, approximately 1,140 m^3. An additional 500 m^3 will be provided from the existing fire water storage tank. This volume is considered sufficient to meet the requirements of the National Fire Protection Association guidelines - NFPA 850: *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations.*

During normal operations the CCGT plant will require 6.5 m^3/hr of raw feedwater when operating on natural gas. Where necessary, supply of water from the main supply will take place during low demand periods in order to minimise any potential impacts on water supply in the area.

High purity demineralised water, used as feed water for the HRSG/Steam Turbine water-steam cycle, will be produced in the water treatment plant, and stored in a 6,000m^3 capacity on-site demineralised water storage tank prior to use. This capacity is sufficient to provide for 94 m^3/hr injection water to the gas turbines for NO_x emissions control purposes while firing on distillate.

Cooling water, for condensing steam, will be abstracted from the Barrow Estuary, in accordance with existing operations, utilising the existing water intake and outfall systems. However the overall demand will be significantly reduced from the current maximum demand of the current 50,170 m^3/hr to approximately 20,000m^3/hr when the CCGT is fully operational.

G.1.2 Secondary Raw Materials

Secondary raw materials include conditioning and seawater injection chemicals, coolants, laboratory smalls, cleaning products and oils and greases.

The use of conditioning chemicals will be optimised through controlled dosing. Conditioning and laboratory chemicals will be stored in a chemical store within the water treatment plant. The storage room will be provided with appropriate ventilation and temperature control. Drums and IBC's will be stored on drip trays/spill pallets. The store will be enclosed fully containing any spills within. A spill kit will be located in close proximity to the chemical store.

As required, conditioning chemicals will be transferred from the water treatment plant to replenish the dosing tanks located within the turbine hall. The transfer route will be kept clear of all obstacles to allow the safe transfer of chemicals. Dosing tanks will be fitted with level indicators and located within bunds. The contents of the drums will be transferred to the dosing tanks using dedicated filling pumps.

Sulphuric Acid (H_2SO_4) and Sodium Hydroxide (NaOH), for use in the water treatment plant, will be stored in 33 m^3 bunded bulk chemical storage tanks. The Sulphuric Acid tank will be fitted with a vapour trap. Gases will vent through the trap media and exit the tank via a vent.

Oils and greases used for the lubrication of the main mechanical components will be stored in a designated bunded area within the stores building.

The generator will be filled with Hydrogen as a closed circuit cooling medium. The hydrogen will be topped up by small amounts using a bottle storage system, as required. Stocks of Hydrogen will be stored in an enclosed designated storage area in UN approved cylinders. The hydrogen system will be earthed and connections will be carried out by trained personnel only. Carbon Dioxide will be used on site for purging the generator of Hydrogen. The cylinders will be fitted with corrosion resistant leak proof valves. Leaks of gases and the ingress of air into the generator cooling system will be prevented through the use of seal oil at a pressure higher than that of the relevant gases.

A Nitrogen blanketing system will be employed to protect the internal surfaces of the HRSG from corrosion and to allow maintenance works to be carried out.

The use and selection of laboratory chemicals will be determined by the on-site monitoring requirements, however their use will be minimised, wherever possible. Cleaning products will be of a water based biodegradable nature, wherever possible. A hazardous detergent is however required for compressor cleaning. Hazardous compressor cleaning products will be segregated in a locked cabinet with limited access to prevent misuse. Compressor cleaning waste water will be disposed of off-site as hazardous waste.

All chemicals stored on site will be subject to a COSHH (Control of Substances Hazardous to Health) assessment and compliance with the requirements of REACH, i.e. *EC Regulation 1907/2006 for the Regulation, Evaluation, Authorisation and Restriction of Chemicals*. Chemicals will be managed in accordance with the HSA guidance document *Guidance for Downstream Users – Guidance for the Implementation of REACH, January 2008*. Final selection of bulk chemicals will be subject to an assessment of trace elements to ensure that they are within acceptable limits.

Table G.1(i) Details of Process related Raw Materials, Intermediates, Products, etc., used or generated on the site

Ref. Nº or Code	Material/ Substance[1]	CAS Number	Danger[2] Category	Amount Stored (tonnes)	Annual Usage (tonnes)	Nature of Use	R[3] - Phrase	S[3] - Phrase
G1	Raw Feedwater	N/A	None	Approx (15,500m^3)	<100,000	Steam generation and potable water supply	N/A	N/A
G2	Distillate Oil	68344-30-5	Cat. 3 Carcinogen Harmful	<10,670	<2,134*	Fuel (in the event of interruption of gas supply, operation of emergency equipment and for short duration testing)	R40 R 51/53 R65 R66	S2 S24 S36/37 S43 S61 S62
G3	Natural Gas	00074-82-8	Extremely Flammable	Not Stored on site	<7·10^8 m^3	Fuel	R12	S16 S33
G4	Hydrogen	1333-74-0	Extremely Flammable	<900 Nm^3 (Generator) <650 Nm^3 (Cylinders)	<7500 Nm^3	Generator Coolant	R12	S9 S16 S33
G5	Ammonium Hydroxide	1336-21-6	Corrosive Ecotoxic	<2	<7	Chemical Conditioning of boiler feedwater	R34 R50	S26 S36 S37 S39 S45 S61
G6	Dilute Carbohydrazide	497-18-7	Ecotoxic	<1	<2	Chemical Conditioning of boiler feedwater	R43 R52/53	S24/25 S26 S28 S36/37/39 S61
G7	Tri-sodium Phosphate	7601-54-9	Corrosive Irritant	<0.5	<2	Chemical Conditioning of boiler feedwater	R34 R36 R37 R38	S26 S27 S36 S37 S39
G8	Sodium Hydroxide	1310-73-2	Corrosive	<16	<60	pH Control	R35	S26 S36 S37 S39 S45
G9	Sulphuric Acid	7664-93-9	Corrosive Irritant	<10	<60	pH Control	R23 R24 R25 R35 R36 R37 R38 R49	S23 S30 S36 S37 S29 S39 S45
Ref. No or Code	Material/ Substance(1)	CAS Number	Danger(2) Category	Amount Stored (tonnes)	Annual Usage (tonnes)	Nature of Use	R(3) - Phrase	S(3) - Phrase
G10	Lubricating Oil	64742-65-0	Ecotoxic	<20	<50	Lubricant in gas turbine and plant	R52/53	S61
G11	Hydraulic Oil	Proprietary	Ecotoxic	<10	<30	Hydraulic oil in steam turbine	-	-

G12	Insulating Gas	Proprietary	Ecotoxic	<74	N/A	and plant Insulating oil in transformers	-	-
G13	Compressor Cleaning Products	9003-13-8 / Proprietary	Irritant	<1	<2.5	Compressor Cleaning	R36 R37 R38 R52 R53	S29 S39 S45 S61

Notes: 1. In cases where a material comprises a number of distinct and available dangerous substances, please give details for each component substance.
2. c.f. Article 2(2) of SI Nº 77/94
3. c.f. Schedules 9 and 10 of SI No 62/2004

* Diesel oil will only be used for the operation of emergency generators, in the event of interruption to gas supply and for short duration testing. The value provided is based on 5% of operating time per annum.

Table G.1(ii) Details of Process related Raw Materials, Intermediates, Products, etc., used or generated on the site

Ref. Nº or Code	Material/ Substance[1]	TA Luft Class 1, 2 or 3	Odour			EU Lists I and II (Tick and specify Group/Family Number)			
			Odourous Yes/No	Description	Threshold µg/m³	Dangerous Substances Directive 76/464/EEC		Groundwater Directive 80/68/EEC	
						List I	List II +129[4]	List I	List II
G1	Raw Feedwater	-	-	-	-	-	-	-	-
G2	Distillate Oil	-	Yes	Hydrocarbon	-	✓	-	✓	-
G3	Natural Gas	-	Yes	Pungent resembling rotting vegetation	-	-	-	-	-
G4	Hydrogen	-	No	-	-	-	-	-	-
G5	Ammonium Hydroxide	3	Yes	Pungent, ammonia	-	-	✓	-	✓
G6	Dilute Carbohydrazide	-	No	-	-	-	✓	-	✓
G7	Tri-sodium Phosphate	-	No	-	-	-	✓	-	✓
G8	Sodium Hydroxide	-	No	-	-	-	-	-	-
G9	Sulphuric Acid	-	No	-	-	-	-	-	-
G10	Lubricating Oil	-	Yes	Hydrocarbon	-	✓	-	✓	-
G11	Hydraulic Oil	-	Yes	Hydrocarbon	-	✓	-	✓	-
G12	Insulating Gas	-	Yes	Hydrocarbon	-	✓	-	✓	-
G13	Compressor Cleaning Products	-	No	-	-	✓	-	✓	-

Notes (cont.): 4. The European Commission priority candidate list

G.2 Energy Efficiency

A description of the energy used in or generated by the activity must be provided. Outline the measures taken to ensure that energy is used efficiently and where appropriate, an energy audit with reference to the EPA Guidance document on Energy Audits should be carried out.

G.2.1 Plant Efficiency

The efficiency of a power plant is defined as the proportion of primary energy input which is converted to electricity. Total electricity output for the CCGT will be up to approximately 430 MW during optimum conditions.

The overall generation efficiency is approximately 58%, this equates to a thermal input of 741 MWth. Most of the low grade heat loss for the CCGT unit will be via the seawater condensing system and from emissions to the exhaust stack. The remainder of the overall cycle losses can be accounted for as both mechanical and electrical losses within the plants.

Energy efficiency is integral to optimising the overall design of a CCGT plant. CCGT technology is the most efficient form of conventional thermal power generation. The Energy Efficiency Manager will help in keeping the plant optimised.

The plant will operate on an advanced computerised control system which will support optimisation of generation efficiency thereby minimising heat loss due to unburned gases. The steam cycle will be optimised by achieving the highest possible steam pressure and temperature. The supplier's contract will detail plant specific energy balance data providing guarantees for heat rate and power output thereby guaranteeing an overall plant efficiency.

Maintenance activities will be scheduled such that plant down-time will be minimised.

Electricity to power ancillary plant and buildings will be provided by the national grid.

G.2.2 Energy Efficiency Measures Employed

The following lists outline measures that will be employed to improve the overall energy efficiency on site, covering two different scopes:

(i) Energy efficiency in the Industrial Process (electricity generation in the CCGP plant)

- Planned maintenance schedules and plant conditioning monitoring will be employed to ensure optimum operating efficiency.
- Widespread use of insulation will be employed to minimise heat loss.
- Cladding and insulation will be inspected regularly and replaced/repaired as soon as practicable.

- Good housekeeping techniques will be employed to minimise energy wastage.
- Natural gas and feedwater will be pre-heated with steam prior to use.
- Plant warm up procedures will be optimised to minimise supplementary fuel use.
- Heat transfer surfaces will be regularly cleaned.
- Where possible, equipment will be shut off when not in use.
- Site vehicles, i.e. forklifts, will comply with all relevant EU standards.
- High efficiency pumps and fans will be employed where practicable.
- High efficiency motors and drives with variable speed will be employed where practicable.

(ii) Energy efficiency in the Main Building

- All employees will be provided with energy use awareness and conservation training. This would basically address good practices in terms of lighting, heating, PCs usage, water usage, etc. in the main building.

Energy usage and opportunities for energy efficiency improvements will be identified and implemented through the Environmental Management Systems. The EMS will focus on resources and energy use minimisation. Objectives and targets will be developed to ensure continuous improvement as considered practicable.

An Energy Efficiency Audit will be completed within the timeframe as may be specified in the IPPC licence as issued. The audit will be undertaken in accordance with the *Guidance Note on Energy Efficiency Audits, EPA (2003).*