Tawnaghmore Generating Station

IPPC Licence Reg. No. P0566-02

Annual Environmental Report 2010

Table of Contents

1.- Introduction

1.1.- IPPC Licence Number P0566-02

This is the Annual Environmental Report of Tawnaghmore Generating Station for the year ending 31st of December 2010, in compliance with requirements of Integrated Pollution Control Licence Register No. P0566-02.

1.2.- Name and Location of Site

Tawnaghmore is located in North County Mayo in an elevated position 3 km to the South of Killala village at National Grid Reference 120370E, 327918N along the R314 Ballina/Killala road. The surrounding catchment area is the Moy River and the land use is predominantly agricultural land.

Endesa Ireland,
Tawnaghmore Generating Station,
Killala
County Mayo.

1.3.- Description of Activities

The activities carried out at Tawnaghmore facility correspond to IPPC Class 2.1

"The production of energy in a combustion plant the rated input of which is greater than 50 MW".

The plant main purpose is covering the peaks in electricity demand.

The generating units are four open cycle FT8 gas turbines fuelled with low sulphur content gas oil (Max. 0.1% S) with a nominal capacity of 26 MW each. There are two electrical generators each of which is connected to two of the FT8 gas turbines. Each generator can produce 52 MW giving a total of 104MW for the site. Two of the frame 8 engines and associated generator were installed during 2008 and are designated as Unit 3. The original plant is designated as Unit 1. Demineralised water injection is used for NO_x emissions reduction.

1.3.1.- Running regime 2010

Unit 1: This generating unit which is rated at 52MW ran for a total of 119.40 hours during 2010.

Unit 3: This generating unit which is rated at 52MW ran for a total of 72.84 hours during 2010.

Station: This generating station at 104 MW ran for a total of 192.24 hours during 2010.

1.3.2.- EPA audits 2010

There was one Agency site visit to Tawnaghmore during 2010. No non-conformances were raised.

The Agency visited the site on 6th May 2010. A site inspection report was subsequently issued to Endesa Ireland. A total of four observations were specified:

1. Remote Operation
2. CEMS Operation
3. Underground tanks
4. Bund Integrity

These items have been addressed and correspondence including corrective actions and results, if applicable, was forwarded to the Agency during 2010. Furthermore, observations are subject to consideration within the plant Environmental Management System.

An amended monitoring regime as per Condition 6.7 of Tawnaghmore´s IPPCL from 2010 onwards was agreed by the Agency on 20th October 2010.

- Condition 6.11;
  - The Agency agrees to Endesa Ireland's proposal to cease the monitoring of noise emissions from the facility, contingent on the operating hours not being increased significantly.

- Schedules B.1 Emissions to Air & C.1.2 Monitoring of Emissions to Air of IPPC License registration number P0566-02 ;
  - Agrees to Endesa Ireland's proposal regarding the cease of biannually monitoring of SO_x, PM and strict compliance with EN14181 (QAL2/AST testing).

- Schedule C.2.2 Monitoring of Emissions to Sewer and Schedule C.2.3 Monitoring of Storm Water Emission;
  - The Agency agrees to the proposed reduction in monitoring frequency at S1 & S2. Further information to be provided in relation to typical volumes and frequency of discharges via S1.
- Condition 6.5;
  - Confirmation of no groundwater monitoring requirements at Tawnaghmore at present.

1.4.- Environmental Policy

Endesa Ireland´s Environmental Policy was reviewed as part of the station's EMS ISO 14001 implementation process that was carried out during the reporting period. However, changes to the organisation environmental policy statement will be applicable to all of its operations across the site from the following reporting year onwards.

endesa ireland

Endesa Ireland's Environmental Policy

Endesa Ireland regards environmental excellence as a fundamental value in the performance of its activities. Accordingly, it respects the environment and responds to the principles of sustainable development and sound environmental management, undertaking in this way to harness and conserve the resources it uses effectively.
To meet its environmental commitments, **Endesa Ireland** applies the following basic principles, which are included as key factors in its Environmental Policy:

- **Integration** of environmental management and sustainable development concept in the Company's corporate strategy, using environmental criteria documented in all planning and decision making processes.
- **Rational use** of resources and reduction of waste production, emissions, discharges and any other type of environmental impact, through the application of continuous improvement programmes and the establishment of environmental objectives and targets.
- **Commitment** to the compliance with all relevant legislative and other requirements by means of a permanent monitoring of the environmental practices in all of its facilities and locations, reporting on the obtained results.
- **Conservation** of the power plants' surroundings by adopting measures designed to protect flora and fauna species and their natural habitats.
- **Implementation** of cleaner and more efficient technologies, as long as they are available and are economically affordable for the Company, encouraging research and development of renewable energies when suitable.
- **Promotion** of its employee's awareness with regard to the environmental protection and respect by communicating the Environmental Policy and making it public and available to all of them, developing specific training programmes and interacting with all types of stakeholders (authorities, institutions, local associations and interest groups).
- **Requiring** its contractors and suppliers the implementation and development of environmental policies aligned with those of **Endesa Ireland's** Environmental Policy, which shall be communicated to all of them.
- **Promotion** of a rational use and energy consume among users and society in general.

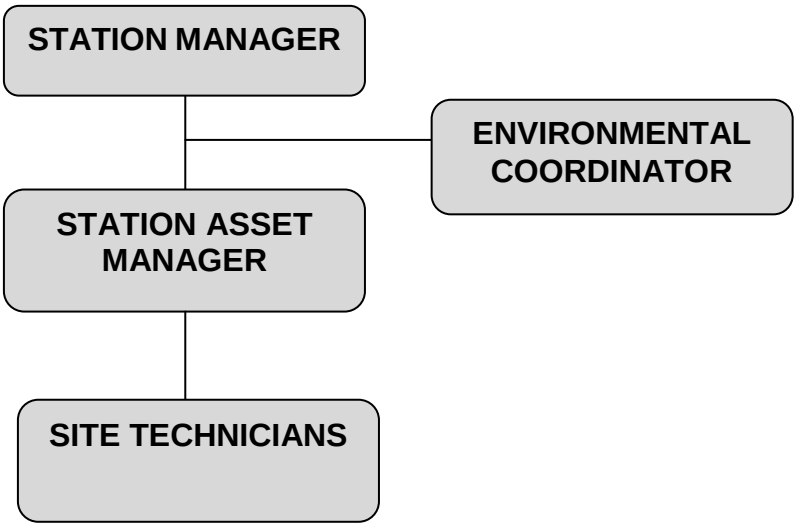
This strong commitment and the above basic principles of **Endesa Ireland's** Environmental Policy are applied consistently across all the environmental processes and activities that are carried out at all **Endesa Ireland's** facilities (Head Office and Power Plants).

Signed: Gerard Crean
Station Manager
(On behalf of the management and staff)

1.5.- Environmental Management Structure and responsibility

Environmental operational management at Tawnaghmore was carried out by Utility Operation and Maintenance Services (UOMS). From the 1st of December 2010, the plant is fully operated and controlled by Endesa Ireland staff members. Figure 1 shows the revised organisation chart.

Figure 1. Organisational Chart



STATION MANAGER

The Station Manager shall ensure that Tawnaghmore's environmental performance fully meets the requirements established within its IPPCL.

ENVIRONMENTAL COORDINATOR

The role of the Environmental Coordinator is to ensure the maintenance and effectiveness of the Environmental Management System established on-site. He/she shall also report to the Station Manager on the plant environmental performance according to the station's licence.

STATION ASSET MANAGER

The role of the Station Asset Manager is to ensure that the operational control is performed at the site according to the legal requirements. He/she shall keep the Environmental Coordinator informed on the plant's environmental performance, as well as on its deviations and the staff training needs.

SITE TECHNICIANS

The role of the Site Technicians is to ensure that activities required by the IPPCL and Environmental Management System are completed as required. She/he assumes the operational responsibility under the supervision of the Station Asset Manager.

2.- Summary Information

2.1.- Emissions to Atmosphere Summary

Unit	1		3		Station Average
Stack	A1	A2	A1	A2	
Average 2010 (mg/m^3)	80	112	79	78	97

Table 2.1. Average NO_x emissions per unit 2010

Tawnaghmore 2010 NO_x average did not exceed ELV for NO_x (120 mg/m^3).

The total quantity of CO_2 emitted was 4,424.61 tonnes.
The estimated total quantity of NO_x emitted was 7.66 tonnes – calculation shown in 3.3
The estimated total quantity of SO_2 emitted was 2.80 tonnes – calculation shown in 3.3

2.1.1.- Abatement/Treatment Control

Monitoring of water and fuel flow rates was ongoing when in production and water and fuel flow rates for each unit were continuously recorded in the control room. In addition, in the event of failure of any flow meter, back-up measures, such as pump speed or the position of control valves, can be used to ensure correct operation of the plant, and water and fuel usage can be computed from readings of tank levels, taking account of deliveries and other usage. A log of the appropriate readings is kept.

For NO_x emissions reduction, each unit is fitted with water injection equipment, through which demineralised water, in approximately the same volume as the liquid fuel, is used to enable the units to operate within the emission limit of 120 mg/m^3. The NO_x emissions reduction water is taken from Mayo County Council public water supply and purified in an ion-exchange plant.

A Continuous Emissions Monitoring System is installed and uses a sampling system to compute NO_x and O_2 levels in each outlet duct. The system is in service whenever the units are running.

After a service the analysers are calibrated by the maintenance contractor using the standard gases are held on site. Unit 1 was serviced and/or calibrated on 30/04/2010, 04/05/2010 and 08/09/2010; Unit 3 was serviced and/or calibrated on 27/04/2010 and 07/09/2010. See Appendix I for the service reports.

2.2.- Emissions to Water Summary

The site has two licensed discharge points:

- (S1) through which the effluent resulting from the regeneration of the ion exchange plant is discharged and
- (S2) for storm water run-off.

The discharge of effluent is automatically regulated by a pH controller which closes the effluent valve when the pH goes outside the range of pH 6 to pH 9 and does not allow the valve to open again until the pH has been within range for at least ten minutes. No exceedance of the ELV's occurred in 2010.

A high reading of 26,948 mg/l TDS (Total Dissolved Solids) from S1 was obtained on 7th July 2010. The IPPCL emission limit value is 25,000 mg/l of discharged effluent. This was reported to the Agency on 15th August 2010 (our reference NCP 05-2010).
The two effluent tanks were cleaned immediately. Further surface water monitoring results carried out on 13th July 2010, TDS's were within the ELV's for the licence. A result of 19,356 mg/l TDS was obtained.

Note:
The licence also stipulates a discharge limit of 750 kg/day. Given Tawnaghmore Water Treatment Plant only discharges approximately 9 m^3 of effluent per regeneration, the reading of 26,948 mg/l TDS is not very significant as the maximum discharge of 750 Kgs of solids per day would require three regenerations per day to exceed. The Station never has more than one regeneration per day.

2.3.- Waste Management Report

Waste leaving the site is recorded in the Waste Register, held by site technicians. A summary of the quantities and disposal information is shown in the Licence-Specific Report (Section 4.3).

2.4.- Resource Consumption Summary

Year	2010	2009
Gas Oil Consumed (tonnes)	1,393.74	821.54
Demineralised Water (tonnes) *	2,700	378
Number of Start ups	99	55

Table 2.4.A Resource Consumption

(*) Total water supplied by Mayo Co. Council was approximately 1,400 tonnes for 2010.

Note:
This is a calculated estimate, taken from monthly average consumption, as meter readings for November and December 2010 were not available from the Co. Council.
As can been seen from the figures, the Demineralised Water consumed was greater than the water supplied by the Council. This is attributed to the loss of ~1,200 m^3 from the Demineralised tank in December 2010 due to a burst pipe during freezing conditions.

The ion exchange plant produces demineralised water. Demineralised water is supplied with the fuel to the engines to reduce combustion temperatures and thus NO_x emission levels. A regeneration of anion/cation units is required for every 300 m^3 (approximately) of water produced. 2,700 m^3 (estimate) of demineralised water were produced during 2010. The increase compared to previous year (378 m^3) is due to adverse weather conditions during last quarter of 2010, when the ground temperatures plummeted to below freezing (-15ºC), the main pipe work of the de-mineralisation tank burst, resulting in the loss of approximately 1,200 m^3 of demin water.

Item	Comment
Gas Oil	Fuel for the gas turbine engines
Demineralised Water	For NO_x emissions reduction
Electricity	The imported electrical energy is small in relation to the amounts of electricity generated. When the plant is shut down this is basically heating and lighting
Domestic Water	The town water supply is used for mess rooms and toilets. The number of people on site varies from one to two during normal operation

Table 2.4.B Resource Consumption Comments

2.5.- Environmental Incidents and Complaints Summary

There were 5 Incidents recorded during 2010:

- **18/01/2010** - NO_x exceedance on Unit 1 Stack 1 (162.35 mg/m^3). The exceedance was recorded at the beginning of the run due to the temperature and % load conditions for the engine. The settings for validating data by CEMS shall not include start up conditions as per Tawnaghmore's IPPCL. Exhaust temperature >100 ºC; Breaker closed; >5% load.
- **19/02/2010** - NO_x exceedence on Unit 1 Stack 2 (460.53 mg/m^3). Underground wash tank full with demineralised water, flow meter reading correctly. Failure of drain to close resulted in a later demineralised water injection flow. Staff on-site replaced the coil.
- **24/06/2010** - CEMS computer did not 'boot up'. Data did not record in the event of either unit running. New computer placed on-site with upgraded software. In addition, spare computer kept on-site.
- **12/07/2010 -** Unit 1 Engine B NO_x exceedance (24 hour average 145.59 mg/m^3). Water pump tripped due to over temperature on variable speed drive. Air conditioning thermostat kept in local control house of Unit 1 at a lower setting (15ºC). Engine B was taken off load and Unit 1 was de-rated by 25MW. Further temperature monitoring was conducted at the Control house.
- **1/10/2010** - Calibration alarms on the CEMS computer on. The monitor was in "Power Save Mode". This stopped the computer recording the calibrations. The cabinets did calibrate but the data was not recorded by the computer. Therefore, U1 running on the 3rd of November 2010 was not recorded until the CEMS computer was power cycled during the run. Endesa Ireland's IT Unit turns off all Power Saving configurations on CEMS' PC's.

There were no complaints from the public during 2010.

2.6.- Non-Compliances Summary

There were no non-compliances recorded in 2010.

3.- Management of the Activity

As stated within Section 1.4 of this report, the Environmental Management System for this site was adapted to meet the ISO 14001:2004 standard during 2010.

The Environmental Management System (EMS) procedures for Tawnaghmore are contained in a folder held by site technicians as well as in electronic format.

Historically, the environmental operational management at Tawnaghmore was carried out by Utility Operation and Maintenance Services (UOMS). Endesa Ireland now has full control and operational management at the site. New staff appointed since December 1st 2010 in order to cover key positions, Site technicians, dealing with Environmental daily activities: Padraic Jackson and Alan Ormsby. Phone 096-32872.

The Station Manager is Gerard Crean and Marta Sabido is the appointed Environmental/Chemistry Coordinator for the plant.

3.1.- Environmental Management Programme 2010

Daily and weekly checks are recorded in paper format, held by site technicians. A computer based work scheduling system is used and records of recurring checks and other environmental work is held in the database.

2010 AER			
Environmental Management Programme 2010			
Objective	**Description**	**Completion Date**	**Achievement Status (%)**
Environmental Management Group	Periodical meetings, at least twice a year.	Dec 2010	50% (Annual Review July 2010)
ISO 14001	Development and implementation of a formal Environmental Management System (EMS) - as defined by the ISO 14001. Application for ISO certification will be submitted when the EMS is in place and working for a number of months.	Dec 2010	100%
Waste Management	Waste Framework Contract	Nov 2010	100%
Energy Efficiency	Energy Efficiency Audit	March 2010	100%

Evidence records available on site for inspection.

3.2.- Environmental Management Programme Proposal 2011

Environmental Management Programme Proposal 2011			
Objective	**Description**	**Person Responsible**	**Date**
EMS ISO 14001 Certification	Achieve ISO accreditation	Environmental Coordinator/ Site Technicians	February 2011
Energy Efficiency	Determine the baseline energy efficiency	Environmental Coordinator/ Site Technicians	December 2011
Infrastructure Upgrading	Undertake upgrading of bunds. Installation of emergency shower at fuel unloading area	Environmental Coordinator/Manager/Assets Manager	December 2011
Water Usage Control	Establish a baseline and monitor consumption	Site Technicians / Assets Manager	December 2011
Air emission monitoring	Investigate possibility of establishing Predictive Emissions Monitoring System	Environmental Coordinator	December 2011

Table 3.2. Environmental Management Programme Proposal 2011

3.3.- Pollution Emission Register Report 2010

Item	Quantity (Tonnes)	Derivation
CO_2	4,424.61	1,393.74 tonnes gas oil * 73.3 (Emission Factor tCO_2/TJ) * 43.31 (NCV TJ/tonne) * 1.0 (Oxidation Factor)/1000
NO_x	7.66	34 (2006 value) * 1393.74/7814*95/120
SO_2	2.80	1,393.74 tonnes gas oil * 0.1/100 sulphur * 1.998 (S to SO_2)

Table 3.3. Summary PER 2010

4.- Licence-Specific Reports

4.1.- Emissions to Atmosphere Report

The following estimations of emissions are made for the purposes of the AER and reflect average running conditions over the reporting periods.

Estimations are based on the assumption of an average efficiency compatible with the above data, flue gas flows normalised to 15% O_2 dry and NO_x emissions of 120 mg/Nm^3, being the IPPC license ELV with which compliance has been demonstrated. In practice, levels much lower than this were achieved.

SO_2 emissions are calculated at the maximum Sulphur content of the gasoil supplied (i.e. 0.1% Sulphur content).

Unit	1		3	
Stack	**A1**	**A2**	**A1**	**A2**
January	112.2	86.4	109.2	89.86
February	99.38	460.53	0	0
March	94.4	92.3	0	106.9
April	100.08	98.52	92.07	99.1
May	84.93	38.09	101.21	99.11
June	34.79	79.61	88.87	61.49
July	90.1	145.59	73	93.4
August	73.83	96.87	96.95	69.74
September	74.4	42.2	87.38	85.64
October	75.3	75.5	28.5	30.5
November	48.25	90.98	60	60
December	69.56	54.49	48.22	65.08
Emission Limit Value	***120***	***120***	***120***	***120***

Table 4.1. Average NO_x (mg/m^3) 2010

The NOx emissions in the 4 stacks were all within their emission limit values for the year, besides two exceedances in February and July in Unit 1 A2:

- On 19th February a NO_x reading of 460.53 (mg/m^3) was obtained in Stack 2, Unit 1.

- On 12th July a NO_x reading of 145.59 [(mg/m³) 24hr hour average] was obtained in Stack 2, Unit 1.

An incident was reported for each – see section 2.5.- Environmental Incidents and Complaints Summary.

4.2.- Emissions to Water Report

4.2.1.- Monitoring of Emissions to Sewer

Emission Point Reference S1

Date	BOD (mg/l)	COD (mg/l)	TPH (mg/l)	pH	Total Dissolved Solids (mg/l)
ELV (mg/l)	*20*	*25*	-	*6-9*	*25,000*
18/03/2010	2	-	<10	within ELV	4,810
07/07/2010	-	3870	-	within ELV	26,948
13/07/2010	-	1158	<10	within ELV	19,356

Table 4.2.1 S1 Sample

According to Tawnaghmore's IPPCL Schedule B3, there are ELVs for Temperature, pH, COD, BOD and TDS. Schedule C.2.2 of the licence determines as monitoring tools for S1 discharges the following parameters: COD, pH, Mineral oil and TDS during plant operation.

In July 2010, it was noted that historically, BOD had been monitored but no COD values were available. Therefore, the approach was to start monitoring COD instead of BOD following schedule C.2.2 monitoring requirements.

There are high results for COD on July 7th and 13th 2010. There was a small quantity of ion exchange resin visible on the floor of one of the holding tanks, which could have occurred during the backwash at previous regeneration. This material would lead to high COD level.
As a corrective action, the Effluent Storage tanks will be cleaned annually. In addition, the COD and BOD trend will be followed up in order to ensure these values meet the station's licence set ELVs.

The high reading of TDS obtained on 7th July 2010 was attributed to the addition of an elevated dosage of sodium hydroxide (NaOH) and hydrochloric acid (HCl) that is added for pH adjustment. Further sampling from 13th July 2010 showed a reduced TDS reading of 19,356 mg/l, which is within the IPPCL limits.

4.2.2.- Monitoring of Storm Water Emission

Emission Point Reference S2

Surface water discharge was monitored at point designated S2.

pH range was generally in the middle of the authorized range between 6 - 9.

TPH (micro g/l) was generally less than 10.

Elevated levels of Mineral Oil and DRO can be attributed to possible oil leakage contamination from the centrifuge which is being addressed.

The increase of TPH value seems to be a result of possible spillage during gas oil unloading late in November 2010. A total of 26 deliveries were completed over a three-day period.

Date	pH pH units	COD mg/l	Mineral oil ug/l	TPH VOCs ug/l	DRO ug/l
06/01/2010	7.7	17	<10	<10	194
09/02/2010	7.6	<10	<10	<10	<10
10/03/2010	7.9	25	<10	<10	47
04/04/2010	7.7	23	<10	<10	*
06/04/2010	8	14	<10	<10	*
16/04/2010	7.8	14	<10	<10	<10
01/05/2010	7.7	48	455	<10	455
13/05/2010	7.2	19	<10	<10	<10
21/05/2010	7.4	21	<10	<10	<10
01/06/2010	7.5	18	199	<10	*
02/06/2010	7.6	33	<10	<10	<10
11/07/2010	8.4	19	<10	<10	<10
03/08/2010	7.5	29	<10	<10	<10
09/08/2010	7.3	24	<10	<10	<10
31/08/2010	7.4	20	<10	<10	<10
13/09/2010	7.5	49	584	<10	898
29/09/2010	7.6	<10	<10	<10	<10
09/12/2010	8	12	<10	839	<10

Table 4.2.2 S2 Sample Data
(*) Readings not provided

4.3.- Waste Management Report

European Waste Code	Hazardous	TFS	Description	Quantity (tonnes)	Recovery / Disposal		
					Carrier	Location	Name & Permit
13 05 07	Y	Y	Oily Water	25	Enva	Portlaoise	W0184-01
20 03 01	N	N	General Waste	10.2	McGrath	Non-recyclables: Mayo Co. Co. Landfill, Derrinumera – or Rathroeen.	Derrinumera : W0021-03 Rathroeen: W0067-02
20 01 01	N	N	Dry Recyclables	3.2	McGrath Industrial Waste, Turlough, Castlebar, Co. Mayo	Recyclable material : Smurfit Recycling, KOG Logistics Ltd. Emerald Salvage Galway Metal Co. Wood Systems.	Skips segregated at Unit 2,Moneen Industrial Estate, Drumconlon, Castlebar. Facility permit PER25 Collection permit CW002 Waste Facility Permit WFP-MO-08-0002-01
16.01.07*	Y	Y	Oil Filters	1.7	Enva	Portlaoise	W0184-01 WCP-DC-08-1116-01
15 02 02*	Y	Y	Solid Oily Waste	0.2	Enva	Portlaoise	W0184-01 WCP-DC-08-1116-01
20 03 04	N	N	Sewage	16	Michael O'Brien, Annagh Cross, Ballyglunin, Tuam. Co. Galway.	Galway County Council Sewage Treatment Works, Weir road, Tuam Co. Galway	Waste Collection Permit CW371

Year	Tonnes
2010	**56.4**
2009	60.6

Table 4.3.1 Total Waste removed from Tawnaghmore during 2010

Year	Disposed (Tonnes)	Recovered / Recycled (Tonnes)
2010	**26.2**	**30.2**

Table 4.3.2 Waste Disposed vs Waste Recycled/Recovered

Note:
Total Hazardous Waste Generated = 26.9 tonnes
Total Non hazardous Waste Generated = 29.4 tonnes
GRAND TOTAL = 56.3 tonnes

% of overall waste recovered was 53.6 %

4.4.- Noise Monitoring Report

No complaints have arisen with respect to noise since generation activity commenced at the site.

A comprehensive noise field survey was carried out in October 29th 2008 by AWN Consultancy Ltd and demonstrated that noise levels generated from the site were well within the licence requirements after the doubling of our production capacity to 104 MW with the installation of Unit 3. The results were in conformance with the required levels (55 dB daytime and 45 dB at night time).

As there has been no change implemented in the plant or the operating regime in addition to the difficulty of scheduling this type of testing due to the station's low (Table 4.4), Tawnaghmore proposed in the AER 2009 to the Agency to allow suspension of yearly noise surveys requirement.

A derogation of this Condition in the licence was finally granted by the Agency on 20th October 2010 as discussed previously.

Year	Station Load Factor (%)
2009	0.75%
2010	1.19%

Table 4.4. Tawnaghmore load factor 2010

4.5.- Tank and Pipeline Testing and Inspection

A visual inspection of all tanks was carried out locally per ESB GDS 16.3. Pipelines are inspected weekly and recorded in the station checklist.

Inspection Area	Date
Main Gas Oil Tank	Due 2013
Demin Tank	Due 2015
Day Tank # 1	Due 2015
Day Tank # 2	Due 2013

Table 4.5 Tank Inspection programme

4.6.- Review of Residuals Management Plan

The RMP was revised in November 2010 updating;

- Review of the activities carried out at the plant, including processes and services.
- Identification of existing and potential hazards, including evaluation of materials consumed and waste generated.
- Consideration of historic environmental incidents.

- Identification of all items of plant and other materials that may be decommissioned rendered safe or removed from the site for disposal or recovery in the event of closure.
- Identification of locations where cleaning, decontamination or remediation works may be required in the event of decommissioning to prevent environmental pollution.
- Reviewed and updated on an annual basis.

4.7.- Review of Environmental Liabilities Insurance Cover

An internal revision (in draft format) of the ELRA was conducted in December 2010 to reflect amendments on-site, including;

- New staff appointment (See section 1.5 above)
- Remote operation of Plant
- New security system
- 2010 monitoring results

Endesa Ireland has arranged for insurance cover, certificate updated and forwarded to the Agency annually, is available for inspection.

4.8.- Energy Efficiency Audit Report

An energy efficiency audit was carried by an independent consultancy during March 2010.

During the audit, the following points were examined:

- the electric supply of the station in relation to energy use;
- potential improvements in energy saving;
- possible corrective actions such as a review of water use in the plant;
- possible improvements in the use of energy resources by personnel;

The conclusion was that there is not a significant margin for improvement in efficiency due to the previous measures carried out in the plant and observed by workers.

Energy consumption in the plant was improved through adjustment of thermostats and photo-voltaic sensors and through the reduction of lighting in certain work areas.

4.9.- Annual Emissions of SO_2 and NO_x

Data on NO_x is contained above in Summary Information.
In relation to control of SO_2 emissions, the fuel was analysed and found to have a sulphur content of 0.1%.

4.10.- Annual Energy Input

The main energy input was 1,393.74 **tonnes of gas oil**. Electricity imports were relatively small for heating, lighting and gas turbine engine auxiliary supplies.

4.11.- Annual Carbon Dioxide

The total quantity of CO_2 emitted was 4,424.61 **tonnes**.

4.12.- Surface Water Monitoring Summary

See Emissions to Water Report above and also comments in Summary Information.

4.13.- Total Net amount of Electricity Generated 2010

Year	2010	2009
MWh Generated	5,239	3,001

Table 4.13. Total Net Amount of Electricity Generated during 2010

Appendix I

ENVIRONMENTAL MONITORING SYSTEMS
EMS

Unit 24 Stadium Business Park
Ballycoolin Road
Dublin 11
Ireland

Tel. : 00353 1 885395
Fax. : 00353 1 885395
E-mail: mail@emsys.i
www.emsys.ie

Customer
Endesa Ireland.
Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 3

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711795

Service Report No.: GH270410-1
Date: 27/04/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Return of repaired analyser. Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site. System okay.

2. Checked S710 analyser's parameters and status page. All okay.

3. Fitted new fibre glass filter and replaced hydrophobic filter.

4. Replaced peristaltic pump kit. Checked all sample and condensate tubing. All in very good condition.

5. Removed analyser from rack and replace sample pump kit and internal filter.

6. Replaced heated head probe filters, gaskets and o-rings.

7. Inspected heated line, pressure and temperature probes. All in good working order.

8. Replaced analyser in rack.

9. Checked all electrical and pneumatic connections.

10. Powered up instrument and allowed to heat up.

11. Checked all parameters.

12. Zeroed and spanned instrument using on site gas. Instrument okay.

13. CEM system okay.

Time on Site: 3.0 Hours

Parts Used
1 x 1 yr Kit SP2000 (2 030 462) 1 x Sun-Control WT20.5K Filters (5 313 317) 1 x Fi56 Filters 55mm Fibreglass (5 312 005) 1 x Peristaltic Pump Kit (2 027 976) 1 x Pump Hose i.d. 4x1.5 1M (5 313 443) 1 x Sample Pump Kit (2 028 438) 1 x Fi64 Filter (2 027 973) 1 x Hose Viton i.d. 3x1 1M (5 314 542)

Engineers Signature: Gary Heslin

Customers Signature: N/A

ENVIRONMENTAL MONITORING SYSTEMS
EMS

Unit 24 Stadium Business Park
Ballycoolin Road
Dublin 11
Ireland

Tel. : 00353 1 8853954
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E-mail: mail@emsys.ie
www.emsys.ie

Customer
Endesa Ireland.
Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 3

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711795

Service Report No.: GH270410-2
Date: 27/04/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Calibration

1. Carried out visual inspection of site.

2. Carried out zero and span of analyser.

3. Instrument working correctly and within specification.

Calibration Values.

	NO		O2	
	Zero	**Span**	**Zero**	**Span**
Gas Values:	0.0000 mg/M3	327.23 mg/M3	0.0000 %VOL	20.800 %VOL
Act Values:	0.9978 mg/M3	333.69 mg/M3	-0.0221 %VOL	20.827 %VOL
	DRIFT in %		**DRIFT in %**	
ABS:	6.989%	-1.40%	-0.54%	-0.82%
DIF:	0.249%	1.974%	-0.11%	0.128%

Drift Limits: +/- 50%
Calibration Date: 16/09/09
Gas Data: Nitric Oxide
Cylinder No: P2862ZD188917
Cert No: 033509
UN No: 1956
Cert Date: 27/08/09
Shelf Life: 36 Months

Time on Site: 3.0 Hours

Parts Used
N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A

ENVIRONMENTAL MONITORING SYSTEMS
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Dublin 11
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Customer
Endesa Ireland.
Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 1

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711802

Service Report No.: GH040510-1
Date: 04/05/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site. System okay.

2. Checked S710 analyser's parameters and status page. All okay

3. Fitted new fibre glass filter and replaced hydrophobic filter.

4. Replaced peristaltic pump kit. Checked all sample and condensate tubing. All in very good condition.

5. Removed analyser from rack and replace sample pump kit and internal filter.

6. Replaced heated head probe filters, gaskets and o-rings.

7. Inspected heated line, pressure and temperature probes. All in good working order.

8. Replaced analyser in rack.

9. Checked all electrical and pneumatic connections.

10. Powered up instrument and allowed to heat up.

11. Checked all parameters.

12. Zeroed and spanned instrument using on site gas. Instrument okay.

13. CEM system okay.

Time on Site: 6.0 Hours

Parts Used
1 x 1 yr Kit SP2000 (2 030 462) 1 x Sun-Control WT20.5K Filters (5 313 317) 1 x Fi56 Filters 55mm Fibreglass (5 312 005) 1 x Peristaltic Pump Kit (2 027 976) 1 x Pump Hose i.d. 4x1.5 1M (5 313 443) 1 x Sample Pump Kit (2 028 438) 1 x Fi64 Filter (2 027 973) 1 x Hose Viton i.d. 3x1 1M (5 314 542)

Engineers Signature: Gary Heslin

Customers Signature: N/A

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Customer
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Killala,
Co. Mayo

Location: Unit 1

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711802

Service Report No.: GH040510-2
Date: 04/05/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site.

2. Carried out zero and span of analyser.

3. Instrument working correctly and within specification.

Calibration Values.

	NO		O2	
	Zero	**Span**	**Zero**	**Span**
Gas Values:	0.0000 mg/M3	325.62 mg/M3	0.0000 %VOL	20.800 %VOL
Act Values:	1.2323 mg/M3	326.10 mg/M3	0.0020 %VOL	20.795 %VOL
	DRIFT in %		**DRIFT in %**	
ABS:	-7.24%	0.956%	-0.12%	0.459%
DIF:	0.308%	0.149%	0.010%	-0.02%

Drift Limits: +/- 50%
Calibration Date: 16/09/09
Gas Data: Nitric Oxide
Cylinder No: P2862ZD411960
Cert No: 033511
UN No: 1956
Cert Date: 27/08/09
Shelf Life: 36 Months

Time on Site: 3.0 Hours

Parts Used
N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A

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Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 3

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711795

Service Report No.: GH070910-1
Date: 07/09/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site. System okay.

2. Checked S710 analyser's parameters and status page. All okay.

3. Fitted new fibre glass filter and replaced hydrophobic filter.

4. Replaced peristaltic pump kit. Checked all sample and condensate tubing. All in very good condition.

5. Removed analyser from rack and replace sample pump kit and internal filter.

6. Replaced heated head probe filters, gaskets and o-rings.

7. Inspected heated line, pressure and temperature probes. All in good working order.

8. Replaced analyser in rack.

9. Checked all electrical and pneumatic connections.

10. Powered up instrument and allowed to heat up.

11. Checked all parameters.

12. Zeroed and spanned instrument using on site gas. Instrument okay.

13. CEM system okay.

Time on Site: 3.0 Hours

Parts Used
1 x 1 yr Kit SP2000 (2 030 462) 1 x Sun-Control WT20.5K Filters (5 313 317) 1 x Fi56 Filters 55mm Fibreglass (5 312 005) 1 x Peristaltic Pump Kit (2 027 976) 1 x Pump Hose i.d. 4x1.5 1M (5 313 443) 1 x Sample Pump Kit (2 028 438) 1 x Fi64 Filter (2 027 973) 1 x Hose Viton i.d. 3x1 1M (5 314 542)

Engineers Signature: Gary Heslin

Customers Signature: N/A

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Customer
Endesa Ireland.
Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 3

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711795

Service Report No.: GH070910-2
Date: 07/09/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Calibration

1. Carried out visual inspection of site.

2. Carried out zero and span of analyser.

3. Instrument working correctly and within specification.

Report for Calibration on 07/09/2010 14:43:40

Device: Unit3 Time Zone GMT Daylight Time

Pollutant	Units		Range	Expected Value	Actual Value	Difference	Drift (%)		Drift Limit (%)	Alarm	OOC
NO	mg/m³	Zero	0	0.0	0.0	0.000	0.00	Zero	2	No	Pass
		Span	1000	327.2	326.8	-0.400	-0.04	Span	2.5	No	Pass
O2	%	Zero	0	0.00	-0.02	-0.020	-0.10	Zero	2	No	Pass
		Span	21	20.80	20.89	0.090	0.43	Span	2.5	No	Pass

Drift Limits: +/- 50%
Calibration Date: 07/09/10
Gas Data: Nitric Oxide
Cylinder No: P2862ZD188917
Cert No: 033509
UN No: 1956
Cert Date: 27/08/09
Shelf Life: 36 Months

Time on Site: 3.0 Hours

Parts Used
N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A

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Customer
Endesa Ireland.
Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 1

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711802

Service Report No.: GH0080910-1
Date: 08/09/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site. System okay.

2. Checked S710 analyser's parameters and status page. All okay

3. Fitted new fibre glass filter and replaced hydrophobic filter.

4. Replaced peristaltic pump kit. Checked all sample and condensate tubing. All in very good condition.

5. Removed analyser from rack and replace sample pump kit and internal filter.

6. Replaced heated head probe filters, gaskets and o-rings.

7. Inspected heated line, pressure and temperature probes. All in good working order.

8. Replaced analyser in rack.

9. Checked all electrical and pneumatic connections.

10. Powered up instrument and allowed to heat up.

11. Checked all parameters.

12. Zeroed and spanned instrument using on site gas. Instrument okay.

13. CEM system okay.

Time on Site: 6.0 Hours

Parts Used
1 x 1 yr Kit SP2000 (2 030 462) 1 x Sun-Control WT20.5K Filters (5 313 317) 1 x Fi56 Filters 55mm Fibreglass (5 312 005) 1 x Peristaltic Pump Kit (2 027 976) 1 x Pump Hose i.d. 4x1.5 1M (5 313 443) 1 x Sample Pump Kit (2 028 438) 1 x Fi64 Filter (2 027 973) 1 x Hose Viton i.d. 3x1 1M (5 314 542)

Engineers Signature: Gary Heslin

Customers Signature: N/A

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Tawnaghmore Peak Power Plant,
Killala,
Co. Mayo

Location: Unit 1

Instrument
Sick Maihak S710 Multigas analyser

Serial No. 711802

Service Report No.: GH080910-2
Date: 08/09/10
Order No.: N/A
Contract No.: 10/102

Service Requested/Fault
Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site.
2. Carried out zero and span of analyser.
3. Instrument working correctly and within specification.

Report for Calibration on 08/09/2010 11:54:50

Device: S700 Time Zone GMT Daylight Time

Pollutant	Units		Range	Expected Value	Actual Value	Difference	Drift (%)		Drift Limit (%)	Alarm	OOC
NO	mg/m³	Zero	0	0.0	0.0	0.000	0.00	Zero	2	No	Pass
		Span	1000	325.6	330.7	5.100	0.51	Span	2.5	No	Pass
O2	%	Zero	0	0.00	-0.00	0.000	0.00	Zero	2	No	Pass
		Span	21	20.80	20.83	0.030	0.14	Span	2.5	No	Pass

Drift Limits: +/- 50%
Calibration Date: 08/09/10
Gas Data: Nitric Oxide
Cylinder No: P2862ZD411960
Cert No: 033511
UN No: 1956
Cert Date: 27/08/09
Shelf Life: 36 Months

Time on Site: 3.0 Hours

Parts Used
N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A