OFFICE OF CLIMATE, LICENSING & RESOURCE USE

- CLIMATE CHANGE UNIT

PROPOSED NEW ENTRANT VERIFICATION REPORT		NE2-005-R1
New Entrant Register Number	**Verified NESA Priority [1]**	**Verified CHPSA Priority**
NE2-005	3	Not applicable
Date:	Compiled: 28 June 2010 Published for consultation 05 July 2010	
RE:	Application for a free allocation of EU allowances from Ireland's New Entrant Set Aside	

Application Details	
Installation name:	Whitegate Independent Power Plant
Installation address:	Fort Davis Road, Whitegate, Co. Cork
GHG permit Register number:	IE-GHG163-01
Class of activity:	Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations)
NESA application received:	14 April 2008
Letter (RFI) issued:	4 June 2008
Further information received:	8 August 2008, 18 December 2008, 19 December 2008, 10 September 2009 (hard copy 5 October 2009), 23 and 26 November 2009, 1 and 2 December 2009, 8 January 2010, 19 January 2010, 9 March 2010, 16 March 2010, 26 March 2010, 8 April 2010, 25 June 2010.
Site Inspection:	12 March 2009 (AP)
New entrant Proposed Start date:	23 February 2010 (first fire), 3 July 2010 (commercial operation date)

Description of the development:

The new entrant application is in relation to a new power plant installation, Whitegate Independent Power Plant (WIPP) a combined cycle gas turbine plant (CCGT) with a permitted (planning permission) capacity of 445 MW_e and rated thermal input capacity of 755 MW_{th} (natural gas). Natural Gas will be used as the primary fuel and

[1] The verified priority may change if applications currently ahead on the list are removed/ their priority changed.

distillate (1% sulphur gas oil) as an emergency reserve fuel. The plant will have a supplementary fired burner, capacity 88 MW_{th}, capable of burning either natural gas or refinery off-gas (ROG) piped directly from the Conoco Phillips Whitegate refinery.

An auxiliary boiler of capacity 44 MWth will be used for start-up and shutdown of the main CCGT plant and will operate on Natural Gas as its primary fuel and distillate (1% sulphur gas oil) as a back up fuel. An emergency generator of capacity 4.4 MW_{th} capacity and a firepump will also be installed. Both of these auxiliaries will operate on distillate (1% S gas oil), which will be supplied by the adjacent refinery.

The operator has agreed to supply Conoco Philips oil refinery with 50 tonnes per hour of steam at 45 bar pressure. The steam supply will be produced primarily by increasing the rate of supplementary firing and ROG will be used at all times during steam delivery to the refinery.

Bord Gais owns and will manage Whitegate Independent Power Plant (WIPP) from within its Strategic Investments group. A dedicated division within this group, Power Generation is responsible for the construction and operation of all energy facilities. The day-to-day operation and maintenance of the plant has been sub-contracted to General Electric for a minimum of 12 years.

Consents submitted:

Planning permission:

0610126 On 2 May 2007, Cork County Council granted permission for a **440 MWe** gas fired electricity generating station comprising a heat recovery steam generator and associated building, main stack, steam turbine generator and gas turbine and associated turbine hall/electrical building and other listed associated buildings. On 23 June 2010 Cork County Council confirmed by letter that "the exporting of **445 MW** of power from the Power Plant to the National Grid is acceptable and in accordance with the terms and conditions of Planning Reg: 06/10126".

078356 On 28 August 2007, Cork County Council granted permission for alterations to the permitted 440 MW gas fired electricity generating station to include the modification and relocation of heat recovery steam generator and associated buildings, steam turbine generator and other listed associated items of plant and buildings.

0713433 On 3 September 2008, Cork County Council granted permission for relocation and modifications to permitted development to include two. demineralised water storage tanks, a raw water storage tank, a 220 kV switchyard control building, an above ground installation (AGI) boiler house and a pipe bridge to Conoco Phillips and other listed buildings and items of plant.

Licence to construct:

The Commission for Energy Regulation granted on 27 August 2007 Authorisation to Bord Gáis Eireann for the construction of a **445 MWe** CCGT generating station at Corkbeg and Glanagow, Whitegate, Co. Cork.

Grid Connection Agreement:

EirGrid plc. Transmission Connection Agreement for a **445 MWe** CCGT power plant at Whitegate Co. Cork made 5 June 2007.

Site Inspection:

Date of Site Inspection: 12 March 2009

Application Representatives: Mr Declan Lynch
Mr Denis Cronin (Project Accountant)
Mr. Tom Daly (Project Manager)

EPA Representatives: Ms Annette Prendergast

Basis for Priority on New Entrant Application Register: A valid application for a development was received on 14 April 2008. Full planning Permission was received on the 2 May 2007, 28 August 2007 and 3 September 2008.

Site Tour Observations: The HRSG, gas turbine and the AGI were noted to be in place but boiler foundations and the generator were awaited.

Documentation Examined:
(i) Substantiated Valid Business Reason:
The Commission for Energy Regulation granted, on 27 August 2007, authorisation to Bord Gáis Eireann, for the construction of a 445 MW CCGT generating station at Corkbeg and Glenagow, Whitegate, Co. Cork. Bord Gáis Eireann and EirGrid plc. entered into a Connection Agreement on 5 June 2007 for the connection of facility with a 445 MW Maximum Export Capacity at Whitegate Co. Cork to the ESB Transmission System. On 30 July 2007 approval was given for the Whitegate Independent Power Plant Project (445 MW CCGT power plant) by the Minister for Communications, Energy and Natural Resources, with the consent of the Minister for Finance, under Section 21 of the Gas Act 1976 (as amended). These documents were submitted as part of the New Entrant application and examined by the EPA.

(ii) Substantiated New Entrant Start Date: First fire was achieved on 23 February 2010 (substantiated by statement signed by GE Energy Project Manager -submitted by Bord Gais on 26 March 2010). According to the finalised Commissioning Plan submitted to EPA on 26 March 2010 the commercial operation date is 3 July 2010.

(iii) Basis for Projections:

At the time of the site inspection, the applicant proposed to calculate the projected emissions as follows:

To calculate the emissions from the CCGT the fuel input data (tonnes per hour) was used with NCV to calculate TJ of fuel per hour and this figure was then multiplied by hours per year and by the country specific emission factor for Natural Gas to calculate carbon dioxide emissions. The same calculation was carried out for use of distillate for 5 days in the CCGT. For the auxiliary boiler the heat input in MWth was calculated from the supplier datasheet, converted to TJ and multiplied by country specific emission factor. The emergency generator is calculated from the rating and the fuel consumption and using a calorific value for distillate and the country specific emission factor the CO_2 emissions were calculated.

Documentation Examined: Project Planning and Feasibility Report, Five year Business Case, GE-Gama Whitegate Project (S109FB-SS) IPS#505192- External Schedule and Bord Gais Networks Progress Report 15. On 8 April 2010 the following documentation was examined "Energy Services Agreement" between BGE and Conoco Phillips and "Construction Interface Agreement signed 1 August 2007".

Detailed Calculation of Projected Emissions

Applicant methodology for calculation of projected emissions:

The latest revised projected emissions for the CCGT plant were submitted on 26 March 2010. These replaced the previous calculations submitted on 8 August 2008, 10 September 2009 and the revised calculations received on 26 November 2009 and 19 January 2010. The latest revised calculations include the Commissioning Phase.

CCGT

The emission projections for the CCGT were based on a first fire date of 23 February 2010. The calculations of emissions during the Commissioning Phase were estimated based on fuel consumption (gas turbine, steam turbine and heat recovery steam generator) calculations (MWh) as provided in the document *GE-Gama commissioning plan (File: WIPP Comm Fuel Plan rev 8 (issued 17 Dec))*. The total fuel requirement per month over the course of the 130 day (23 February until 2 July 2010) commissioning period was calculated based on the 30-minute fuel requirement (if any). To calculate the monthly CO_2 due to natural gas in the CCGT an emission factor of 0.201 tCO_2/MWh was applied. This was based on the default factor of 56.1 t CO_2/TJ (listed in Table 4 of Commission Decision 2007/589/EC) multiplied by 3.6 $x10^3$ (conversion factor for MWh to TJ). Bord Gáis have confirmed (letter of 10 September 2009) that all the calculations are on the basis of net calorific value.

The contractor also plans to test distillate (1% S gas oil) in the CCGT during Commissioning. To calculate the CO_2 emissions arising from distillate use in the CCGT during the Commissioning Phase an emission factor of 0.263 tCO_2/MWh was applied based on the country specific factor for gas oil.
The MWh associated with the commissioning of the CCGT and the CO_2 arising has been tabulated below:

130 days Commissioning from 23 February until 2 July 2010	**MWh CCGT on natural gas**	**tCO_2**
	872,494	175,371
	MWh CCGT on gas oil	**tCO_2**
	51670	13,589

In the operational phase (3 July 2010 until 31 December 2012) the MWh relating to natural gas consumption in the CCGT was calculated by the contractor based on performance data, load factors and a Bord Gais Model for Operational Profile. From this data it was estimated by the applicant that that hourly thermal input during the operational phase is 724.16 MWh in 2010 (with the exception of 3-31 July 2010), 716.29 MWh in 2011 and 723.403 MWh in 2012. The emission factor of 0.201 t CO_2/MWh was then applied. These calculations are tabulated below for the three years:

Year	MWh CCGT on natural gas	tCO_2
3 July to 31 July	509,243	102,358
1 August-31 December 2010 (153 days)	2,659,116	534,482
2011	6,274,700	1,261,215
2012 (366 days)	6,354,372	1,277,229

The CCGT will operate on gas oil for 10 hours each month (120 hours per annum) and the contractor has calculated that 7,393 MWH distillate will be used per month. The emission factor of 0.263 t CO_2/MWh for gas oil was then applied. These calculations are tabulated below for the three years:

Year	MWh CCGT on gas oil	tCO_2
July-December 2010 (6 months)	44,358	11,666
2011	88,716	23,332
2012	88,716	23,332

Auxiliary boiler

During the commissioning phase, the auxiliary boiler will operate primarily on natural gas to support the CCGT commissioning, similar to normal operations with a calculated monthly consumption of 1,651 MWh. It is expected that the auxiliary boiler will operate on natural gas for 420 hours per annum. The boiler was also expected to run in test mode from March 2010 (initially 100 MWh) and then similar to operations phase it is expected to consume 471 MWh gas oil per month. The annual operating hours for the auxiliary boiler on gas oil is 120 hours.

Year	Auxiliary Boiler on gas oil (MWh)	tCO_2 (gas oil)	Auxiliary Boiler on natural gas (MWh)	tCO_2 (natural gas)
130 days Commissioning from March until end June 2010	1613	424	6604	1,327
July-December 2010 (6 months)	2826	743	9906	1,991
2011	5,652	1,486	19,812	3,982
2012	5,652	1,486	19,812	3,982

Emergency Generator and the Fire Pump

Regular testing of the emergency generator is due to begin in April 2010 with an estimated 11.55 MWh distillate consumed every month (based on the equipment datasheet on fuel consumption rate and heat balance). The emergency generator is expected to run for 32 hours each year. The fire pump will begin operation in April 2010 and will be test run for 15 minutes per week with a monthly total distillate use of 0.2 MWh. In the operational phase the fire pump will be run for a total of 2 hours per month at a fuel consumption rate of 0.8 MWh per month (miscalculated as 4 x 0.2 MWh rather than 2 x 0.2 MWh).

Combustion source	Distillate Consumption MWh			Tonnes CO_2		
	2010	2011	2012	2010	2011	2012
Emergency Generator	104	139	139	27	36.5	36.5
Emergency Fire Pump	6.0	9.6	9.6	2	2.5	2.5

Refinery Off-Gas

There is no planned usage of ROG in the supplementary burner during the Commissioning Phase. The ROG system was under design in December 2009 and was not expected to be operational until 2012 at the earliest. When operational the project contractors, PB Power estimated that the plant will consume 168,344 MWh of ROG per annum. A factor of 0.184 tCO_2/MWh was used by BGE in the ROG calculations. This was based on the default factor for refinery gas of 51.3 t CO_2/TJ (listed in Table 4 of Commission Decision 2007/589/EC) multiplied by $3.6x10^3$ (conversion factor for MWh to TJ).

Year	MWh Supplementary boiler on Refinery Off-Gas (ROG)	tCO_2
2010	0	0
2011	0	0
2012	168,344	30,975

The tables below summarise the applicant's projected tonnes of CO_2 from the installation:

Applicant Projected tonnes CO_2/annum By Source

Source	2010	2011	2012
CCGT	837,467	1,284,547	1,300,561
Auxiliary boiler	4,486	5,468	5,468
Emergency Generator and Firepump	29	39	39
Supp Burner on ROG	0	0	30,975

Applicant Total Projected tonnes CO_2/annum

2009	2010	2011	2012
0	841,982	1,290,055	1,337,043

EPA methodology for calculation of projected emissions:

The EPA applies the emission factor of 205.6032 kg CO_2/MWh (NCV). This is based on the country-specific emission factor for Natural Gas in 2009 (57.112 tCO_2/TJ).

CO_2 emissions during commissioning are detailed below:

Day 1 of Commissioning was 23 February 2010 (as confirmed by the statement signed by GE Energy Project Manager, submitted by Bord Gais on 26 March 2010). The applicant's calculations for the 130 day period remain unchanged in relation to fuel consumption (MWh) but the emission factor has been updated by the EPA to reflect the country-specific emission factor for 2009. During commissioning when the

CCGT was tested on distillate, the total MWh fuel consumption (both distillate and natural gas) for that month, as per the finalised Commissioning Plan of the 26 March 2009, was used in the calculation and the emission factor based on natural gas was applied. The final day of the Commissioning Phase is expected to be 2 July 2010 and the Commercial Operation Date is now expected to be 3 July 2010.

CO_2 emissions during commercial operation (from 3 July 2010, 2011 and 2012) are calculated as follows:
In relation to electricity generation the approach as recommended in the NAP, based on a "Best New Entrant" (BNE) CCGT power plant (CER 2007) has been deemed appropriate by the EPA. The basis for the projections has been determined as follows:
(Net electrical output MW/BNE efficiency for CCGT plant of 54.7%)* (number of hours per year, 8760)* (CER recommended capacity utilisation factor, 90.87%)* (Emission factor for natural gas, 205.6032 kg CO_2/MWh (NCV).

Monthly EPA Adjusted Commissioning and initial commercial operation emissions

Month	Commissioning Activity (CCGT)	Fuel Consumption MWth (NCV)	Tonnes CO_2
February	1st fire and synchronising	19,609	**4,032**
March	Base load operation	96,822	**19,907**
April	Performance Testing	249,705	**51,340**
May	Operational testing, distillate testing (51670 MWth gas oil), reliability run	154,262	**31,717**
June	Final plant checks, operations phase	374,233	**76,943**
July	1-2 July	29,533	**6,072**
	Commercial Operation (from 3 July)		**105,787**
August	Commercial Operation (first full month)		**113,083**

Example of BNE Calculation

(Net electrical output of 445 MW_e/BNE efficiency of 54.7% = 813.5 MWth) *8760 (hours in 365 day year)*(CER recommended capacity utilisation factor, 90.87%)* (Emission factor for natural gas, 205.603 kg CO_2/MWh (NCV)/1000 (convert kg to tonnes) =

1,331,456 tonnes for 365 days per year (24 hours per day)

For July 3 to July 31 (29 days/696 hours) calculation is 1,331,456 *696/8760 = 105,787 tonnes

For August (31 days* 24 hours) = 1,331,456*744/8760 = 113,083 tonnes

For 2010 the operational hours has been adjusted pro-rata to allow for the start of commercial operations on 3 July 2010 and therefore a total of 4,368 operational hours in 2010. This is equivalent to 663,904 tonnes from commercial operation in addition to 190,011 tonnes arising from commissioning period.

Projected CO_2 emissions arising from CCGT for 2010, 2011 (365 days) and 2012 (366 days) respectively are given for each year in the table below:

EPA Calculated Projected tonnes CO_2/annum for CCGT:

2010	2011	2012
853,915	1,331,456	1,335,104

Auxiliary Boiler, Emergency Generator and Fire Pump

The use of the auxiliary boiler at the Whitegate site has been justified by the operator as being required for start up of the plant and providing gland seal steam to the steam turbines, blade cooling steam to the steam turbines and steam to run the air ejector.

The EPA considers the auxiliary boiler to be part of the electricity generation plant and as such no additional projected tonnes CO_2 in relation to the auxiliary boiler have been allotted. The Best New Entrant (BNE) calculation covers all plant whose primary function (either directly or in a support capacity) is in the generation of electricity. Similarly, there is no additional projected tonnes CO_2 relating to the operation of the emergency generator or the fire pump.

Export of Steam/Use of ROG

Bord Gáis Eireann entered into an agreement "Energy Services Agreement" (signed 1 August 2007) with Conoco Phillips Refinery to supply steam (as nominated by the refinery) to a maximum of 50 tonnes per hour and to accept ROG from Conoco Phillips to a maximum of 1.5 tonnes per hour. The agreement stipulates that ROG is

used at all times when delivering steam to the refinery. The agreement does not specify a date by which the export of steam should commence.

In the "Construction Interface Agreement (signed 1 August 2007)" it is stated that upon receiving the request from Conoco Phillips, BGE must propose a programme for construction with the undertaking to complete construction and testing of the BGE steam line steam header and/or condensate line within 12 months of such a request. To date this request has not been received.
The EPA considers that Conoco Phillips has already received a full allocation for it's processes and it would have to be demonstrated that any supply of steam by a third party was additional to the existing combustion requirements of Conoco Phillips and not replacement steam capacity.
In addition there is no specified commencement date for supply of steam and a lead in time of at least 12 months before the necessary works are in place, it is considered that there is insufficient assurance that the steam production (and associated emissions) will commence within the trading period and therefore no projected tonnes CO_2 in relation to the proposed supply of steam have been included in the relevant emission given below.

EPA total projected tonnes CO_2/annum for the installation:

2009	2010	2011	2012
0	853,915	1,331,456	1,335,104

Recommendation

The new entrant set aside application is found to have the necessary consents in place and to have a substantiated start date as detailed above. The applicant gas consumption estimates during commissioning are judged to be reasonable. The approach, as recommended in the NAP, based on a "Best New Entrant" (BNE) CCGT power plant (CER 2007), has been deemed appropriate by the EPA for the calculation of emissions during commercial operation. A valid business reason is available. It is recommended that the new entrant set aside allocation be taken from NESA and be based on the following Relevant Emission (tonnes CO_2/annum) subject to verification of the start-up date for commercial operation:

2008	2009	2010	2011	2012
0	0	853,915	1,331,456	1,335,104

Signed: Maria Martin Date: 28 June 2010

pp **Elaine Farrell**

Inspector

Signed: Maria Martin Date: 28 June 2010

pp **Annette Prendergast**

Inspector

Approved: Maria Martin Date: 05 July 2010

Dr Maria Martin

Senior Manager