Verification Report

on the Annual Emission Reports 2006

proposed

by the Electricity Authority of Cyprus

for its installations covered by the

EU Emissions Trading Scheme

prepared by
TÜV Immissionsschutz und Energiesysteme GmbH

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Publicly Certified Verifier for Emissions Trading

and

Accredited Verifier for the Verification of Annual Emission Reports
by the

Competent Authority of Cyprus
(Ministry of Agriculture, Natural Resources and Environment)

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List of Abbreviations

CAR	Corrective Action Request
CC	Carbon Content
CL	Clarification
EAC	Electricity Authority of Cyprus
EMAS	Environmental Management Audit Scheme
ER	Emission Report
ETS	Emissions Trading Scheme
EU	European Union
GHG	Greenhouse Gas
HFO	Heavy Fuel Oil
IPCC	Intergovernmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
ISO	International Standardisation Organisation
LFO	Light Fuel Oil (Diesel)
MM	Monitoring Methodology
MP	Monitoring Plan
MRG	Monitoring and Reporting Guidelines
NAP	National Allocation Plan
NCV	Net Calorific Value
PS	Power Station

Reference List

/1/ Directive 2003/87/EC of the European Parliament and the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowances trading within the Community and amending Council Directive 96/61/EC)
published in the Official Journal of the European Union on October 25th, 2003
OJ L275, 25.10.2003, p. 32-46

/2/ Commission Decision of 29. January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and the Council
published in the Official Journal of the European Union on February 26th, 2004
OJ L59, 26.02.2004, p. 1-74

/3/ Greenhouse Gas Emissions Permit, Vasilikos Power Station (CY – ET01/1)
Ministry of Agriculture, Natural Resources & Environment, 27.10.2005

/4/ Monitoring and Reporting Plan for Greenhouse Gas Emissions from Vasilikos Power Station, Electricity Authority of Cyprus, 25.01.2006

/5/ Greenhouse Gas Emissions Report for 2006, Vasilikos Power Station
Electricity Authority of Cyprus, 09.02.2007 (Annex 1)

/6/ Greenhouse Gas Emissions Permit, Moni Power Station (CY – ET02/1)
Ministry of Agriculture, Natural Resources & Environment, 27.10.2005

/7/ Monitoring and Reporting Plan for Greenhouse Gas Emissions from Moni Power Station, Electricity Authority of Cyprus, 25.01.2006

/8/ Greenhouse Gas Emissions Report for 2005, Moni Power Station
Electricity Authority of Cyprus, 09.02.2007 (Annex 1)

/9/ Greenhouse Gas Emissions Permit, Dhekelia Power Station, (CY – ET03/1)
Ministry of Agriculture, Natural Resources & Environment, 27.10.2005

/10/ Monitoring and Reporting Plan for Greenhouse Gas Emissions from Dhekelia Power Station, Electricity Authority of Cyprus, 25.01.2006

/11/ Greenhouse Gas Emissions Report for 2005, Dhekelia Power Station
Electricity Authority of Cyprus, 09.02.2007 (Annex 1)

/12/ Letter of preliminary approval of the Methodology for Monitoring Greenhouse Gas Emissions in accordance with the Implementation of Greenhouse Gas Emissions Trading System Law No.132(I)/2004
Ministry of Agriculture, Natural Resources & Environment, 27.01.2006

/13/ National Allocation Plan (2005 – 2007)
Republic of Cyprus
October 2004

/14/ Verification Report on the Annual Emission Reports 2005 proposed by the Electricity Authority of Cyprus
Version 02-2006, March 21st, 2006
prepared by TÜV Immissionsschutz und Energiesysteme GmbH

1. Executive Summary

Greenhouse Gas Permits (GHG-permits) have been issued to the Electricity Authority of Cyprus (EAC) by the Ministry of Agriculture, Natural Resources & Environment (Republic of Cyprus) for its three power stations (VASILIKOS, MONI and DHEKELIA Power Station) on October 27th, 2005 /3/, /6/, /9/. According to these GHG-permits EAC has developed monitoring & reporting plans (MP) /4/, /7/, /10/, which have been preliminary approved by the Competent Authority of Cyprus (Ministry of Agriculture, Natural Resources & Environment) on January 27th, 2006 /12/. Based on these GHG-permits and the approved MPs EAC has established the required Greenhouse Gas Emission Reports 2006 (ER) for each of its installation (Annex 1).

A compliance check between the requirements of the approved MPs and EAC´s annual emission reports has resulted in

- three Clarifications (CL 01-03) and
- two Corrective Action Requests (CAR 01-02).

An on-site assessment of the three installations has been performed in week 10 of the year 2007 (March 5th – 7th). During this on-site assessment the operator has proven evidence that monitoring and reporting is in line with the legal requirements (GHG-Permit, approved MPs) and so the verifier concludes on the basis of this assessment that the data within the emission reports contains no omissions, misrepresentations or errors leading to material misstatement of the reported information.

The verified CO_2-emissions of the year 2006 for the three power stations are as follows:

- **Vasilikos Power Station (CY – ET01/1) 1.565.277 t CO_2**
- **Moni Power Station (CY – ET02/1) 497.481 t CO_2**
- **Dhekelia Power Station (CY – ET03/1) 1.590.622 t CO_2**

If the total CO_2-emissions of the year 2006 of all three power stations (3.653.380 t CO_2) are compared to the total allocated amount of EU-allowances of the year 2006 which are given as 3.866.217 t CO_2 (see National Allocation Plan /13/) the power stations of EAC have emitted 212.837 t CO_2 less.

If the total CO_2-emissions of the years 2005 and 2006 of all three power stations (7.125.224 t CO_2) are compared to the total allocated amount of EU-allowances which are given for these two years as 7.618.457 t CO_2 (see National Allocation Plan /13/) the power stations of EAC have emitted 493.233 t CO_2 less.

2. Introduction

The Electricity Authority of Cyprus (EAC) has accepted on December 13th, 2005 the quotation prepared by the TÜV Immissionschutz und Energiesysteme GmbH/Member of the TÜV Rheinland Group (TÜV) of November 3rd 2005 for

"CONCULTANCY SERVICES
FOR THE VERIFICATION OF GREENHOUSE GAS EMISSIONS"

as provided by the EU-ETS Directive /1/ at EAC´s three power stations

(1) VASILIKOS Power Station
(2) MONI Power Station and
(3) DHEKELIA Power Station,

for the period 2005-2007.

The offered and accepted procedure for the first year verification consisted of two parts:

- Validation of EAC´s monitoring methodology (MM)
- Verification of EAC`s annual emission report 2005 (ER 2005) based on EAC´s MM

As a result of the validation and verification procedure the GHG-permits and the monitoring & reporting plans (MP) have been adjusted by the operator in close contact with the competent authority. The updated versions of the GHG-permits and the MPs have been added as Annex 1 to 4 to the last verification report /14/. Based on these documents the operator has continued to establish the annual emission reports for his three installations.

This verification report summarizes the findings of the verification of the annual emission reports for the second year of the commitment period (2006), which have been sent to the verifier on February 9th, 2007.

The verification procedure itself has been in line with the requirements of the EU-ETS Directive /1/ and the Monitoring and Reporting Guidelines /2/.

3. Verification of Annual Emission Reports

The verification procedure has been in line with the requirements given in Annex V of the EU-ETS Directive /1/ and considers especially the following three analyses:

Strategic analysis

The verification is based on a strategic analysis of all the activities carried out in the installation. The verifier has got an overview of all the activities and their significance for emissions.

Process analysis

The verification of the information submitted to the verifier has been carried out off site and on the site of the installations (March 5th – 7th, 2007). The verifier has used spot-checks to determine the reliability of the reported data and information.

Risk analysis

The verifier has submitted all the sources of emissions in the installations to an evaluation with regard to the reliability of the data of each source contributing to the overall emissions of the installation. On the basis of this analysis the verifier has investigated whether sources with a high risk of error and other aspects of the monitoring and reporting procedure which are likely to contribute to errors in the determination of the overall emissions could be identified. This especially involves the choice of the emission factors and the calculations necessary to determine the level of the emissions from individual sources. Particular attention has been given to those sources with a high risk of error and the abovementioned aspects of the monitoring procedure. The verifier has taken into consideration any effective risk control methods applied by the operator with a view to minimising the degree of uncertainty.

For performing these analyses EAC has submitted the emission reports of the year 2006 to the verifier. The verifier has assessed whether the monitoring methodology applied by the operator complies with the installation's monitoring methodology as approved by the competent authority, the principles for monitoring and reporting presented in section 3 of the MRG, and the guidelines laid down in Annex II of the MRG. On the basis of this assessment the verifier has investigated as to whether the data within the emissions report contains omissions, misrepresentations or errors that lead to material misstatement of the reported information.

As part of the verification process, the verifier has in particular:

- assessed each activity undertaken by the installation, the sources of emissions within the installation, the metering equipment used to monitor or measure activity data, the origin and application of emission factors and oxidation/conversion factors, and the environment in which the installation operates,
- assessed the operator's data management system and overall organisation with respect to monitoring and reporting, and obtained, analysed and checked the data contained within the data management system, establish an acceptable materiality level in the context of the nature and complexity of the installation's activities and sources,
- analysed the data risks which could lead to a material misstatement within the emissions report, based on the verifier's professional knowledge and the information submitted by the operator,
- drawn up a verification plan which is commensurate with this risk analysis and the scope and complexity of the operator's activities and sources, and which defines the sampling methods to be used with respect to that operator's installations,
- carried out the verification plan by gathering data in accordance with the defined sampling methods, plus all relevant additional evidence, upon which the verifier's verification conclusion might be based,
- checked that the application of the monitoring methodology specified in the permit has delivered an accuracy level consistent with the defined tiers,
- requested the operator to provide any missing data or complete missing sections of audit trails, explain variations in the emissions data, or revise calculations, before reaching a final verification conclusion.

Throughout the verification process, the verifier has determined potential misstatements by assessing whether:

- the quality assurance and control processes described in chapter 7.1, 7.2 and 7.3 of the MRG have been implemented,
- there is clear and objective evidence obtained through the gathering of data to support the determination of misstatements.

The verifier has assessed the materiality both of any individual misstatement and of the aggregate of uncorrected misstatements, taking into account any omission, misrepresentation or error that could lead to misstatement. The level of assurance has considered a materiality threshold determined for each installation.

3.1 Strategic Analysis

3.1.1 Vasilikos Power Station

is a combustion installation and part of the energy activities described in Annex I of the EU ETS Directive. Heavy Fuel Oil (HFO) and Light Fuel Oil (LFO), i.e. Diesel are used as fuel streams. Electricity is produced by three steam turbines (3 x 130 MW = 390 MW) and one gas turbines (1 x 38 MW = 38 MW). Thus the total capacity of the installation is 428 MW. No CO_2-relevant flue gas cleaning equipment is in operation.

Although the installation is rather big and produces a lot of CO_2-emissions, its complexity is limited: only two fuel streams and no material stream responsible for CO_2-process emissions.

No CO_2-relevant changes (e.g. applied technology, fuel streams) have been made in comparison to the reporting year 2005 /14/.

3.1.2 Moni Power Station

is a combustion installation and part of the energy activities described in Annex I of the EU ETS Directive. Heavy Fuel Oil (HFO) and Light Fuel Oil (LFO), i.e. Diesel are used as fuel streams. Electricity is produced by six steam turbines (6 x 30 MW = 180 MW) and four gas turbines (4 x 37,5 MW = 150 MW). Thus the total capacity of the installation is 330 MW. No CO_2-relevant flue gas cleaning equipment is in operation.

Although the installation is rather big and produces a lot of CO_2-emissions, its complexity is limited: only two fuel streams and no material streams responsible for CO_2-process emissions.

No CO_2-relevant changes (e.g. applied technology, fuel streams) have been made in comparison to the reporting year 2005 /14/.

3.1.3 Dhekelia Power Station

is a combustion installation and is part of the energy activities described in Annex I of the EU ETS Directive. Only Heavy Fuel Oil (HFO) is used as fuel stream. Electricity is produced by six steam turbines (6 x 60 MW = 360 MW). Thus the total capacity of the installation is 360 MW. No CO_2-relevant flue gas cleaning equipment is in operation.

Although the installation is rather big and produces a lot of CO_2-emissions, its complexity is limited: only one fuel stream no material streams responsible for CO_2-process emissions.

No CO_2-relevant changes (e.g. applied technology, fuel streams) have been made in comparison to the reporting year 2005 /14/.

3.2 Process Analysis

3.2.1 Vasilikos Power Station

The on site assessment has taken place on Tuesday March 6th, 2007. The amount of fuel streams (HFO, LFO) used in 2006 and archived by the operator has been verified as follows (details see following lists):

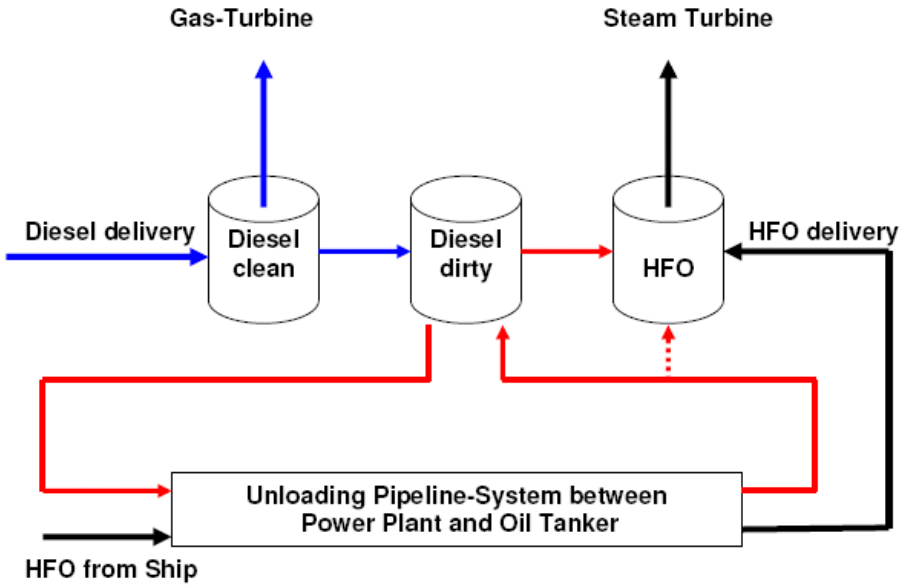
- Consumption of HFO in 2006: 486.936,465 t
- Consumption of LFO in 2006: 285,410 t

Date	Delivery HFO (Heavy Fuel Oil) [t]	Carbon Content* [kg C / kg HFO]
06.01.2006	44.547,460	0,8867
11.02.2006	47.350,569	0,8758
12.03.2006	48.965,741	0,8803
16.04.2006	44.622,010	0,8739
29.05.2006	44.930,210	0,8753
01.07.2006	45.067,235	0,8780
23.07.2006	44.974,895	0,8804
20.08.2006	44.312,114	0,8778
24.09.2006	44.900,135	0,8810
25.10.2006	44.894,011	0,8863
08.12.2006	45.034,314	0,8909
Total delivery 2006	**499.598,694**	**mass weighted average 0,8806**
Transfer from Diesel Oil tanks	**+256,324**	
Stock 01.01.2006	**+ 66.084,458**	
Stock 31.12.2006	**-79.003,011**	
Consumption 2006	**486.936,465 t**	

*measured by ITS Testing Services Ltd. (London) accredited for Elemental Analysis (Carbon, Hydrogen and Nitrogen ASTM D5291-02) according to ISO 17025 (United Kingdom Accreditation Services, Issue No. 021, Issue Date March 6th, 2006)

Date	Delivery LFO (Diesel) [t]
05.12.2006	418,891
Total delivery 2006	**418,891**
Stock 01.01.2006	**+ 3.724,278**
Stock 31.12.2006	**-3.601,435**
Transfer as "Dirty Oil" to HFO-tanks	**-256,324**
Consumption 2006	**285,410**

LFO (Diesel) is used for combustion in the gas turbine and for cleaning of the unloading pipeline for the transportation of HFO from a ship to the power plant. Therefore a second Diesel tank is in operation, which stored the LFO used for cleaning purposes (called dirty Diesel – see following picture). As part of this cleaning process, which takes place after each delivery of HFO a certain amount of dirty Diesel (= LFO polluted with HFO) is transferred to the HFO tank for combustion purposes. This amount is determined by the difference of the levels in the dirty Diesel tank before and after the cleaning process and documented in the HFO delivery protocol signed by EAC and the representative of the fuel supplier.



As in 2005 both fuel streams, i.e. HFO and LFO have been characterised with a constant default value for the carbon content (= 85%), this fuel transfer had no impact on the CO_2-inventory and was therefore not considered. However, in 2005 HFO has a higher carbon content and thus the transfer of dirty Diesel has been considered. As can be seen in above tables dirty Diesel is considered in the inventory 2006 as HFO.

The delivery records of HFO and LFO have been checked by the verifier. The operator has additionally declared and signed that the above listed figures of fuel deliveries during the year 2006 to Vasilikos Power Station are complete, i.e. no other fuel streams have been used for combustion purpose within the power station.

The delivery of HFO (Heavy Fuel Oil) has been recorded analogous to 2005 /14/ and has considered the influence of temperature on density and thus on mass of HFO. For each batch a delivery record signed by the power station manager and a representative of the fuel supplier has been presented.

Temperature has been measured with an accuracy of ± 0,25°C, i.e. related to a average temperature of 35°C the accuracy is ± 0,7%.

Dips and ullages have been measured with an accuracy of ± 1 mm, i.e. related to an average net dip (accepted gross dip after receipt – accepted gross dip before receipt) of about 8 m the accuracy is ± 0,0125%.

The HFO-stocks at the beginning and at the end of the year 2006 have been recorded by the operator. The values could be verified in operational log books. The accuracy corresponds to the measurements of dips and ullages.

The operator has provided evidence for the delivery of LFO (Diesel) by corresponding delivery records and invoices of the fuel supplier (Petrolina Holdings Ltd. Larnaca). The accuracy of the measuring device of the fuel supplier (SMITH METER with Serial No. 18DJ-11100 and 18DJ-111022) 7 is significantly lower than 1,0% (Meter Proving by Hellenic Technical Enterprises Ltd., date of calibration 05.10.2006). The LFO-stream is a de-minimis stream of the installation.

The LFO-stocks at the beginning and at the end of the year 2006 have been recorded by the operator (see also chapter 3.3.1). The values could be verified in operational log books. The accuracy corresponds to the measurements of dips and ullages /14/.

Annual CO_2-emissions:

In 2005 the carbon content of the fuel stream could be calculated with a constant default value of 0,85 kg CO_2 per kg fuel. However, in the year 2006 (and 2007) the annual CO_2-emissions generated by the combustion of HFO shall be calculated - according to the GHG-permit - with an analytical determined value of the carbon content. A mass weighted average of 88,06% has been determined by an independent laboratory.

Thus the annual CO_2-emissions generated by the combustion of HFO in the year 2006 are as follows:

CO_2[t] = (mass of fuel) x (carbon content) x (molecular weight of CO_2/atomic weight of C) x oxidation factor

mass of fuel = mass of HFO = 486.936,465 t

carbon content = 0,8806 t C / t fuel

molecular weight of CO_2/atomic weight of C = 44 / 12 = 3,667

oxidation factor = 0,995

CO_2[t] = 486.936,465 x 0,8806 x (44/12) x 0,995 t CO_2 = **1.564.392 t CO_2**

As the annual CO_2-emissions generated by the combustion of LFO can be calculated according to an elevation given by the Competent Authority with a default value for the carbon content of 85% the calculation is as follows:

CO_2[t] = (mass of fuel) x (carbon content) x (molecular weight of CO_2/atomic weight of C) x oxidation factor

mass of fuel = mass of LFO = 285,410 t

carbon content = 0,85 t C / t fuel

molecular weight of CO_2/atomic weight of C = 44 / 12 = 3,667

oxidation factor = 0,995

CO_2[t] = 285,410 x 0,85 x (44/12) x 0,995 t CO_2 = **885 t CO_2**

The total CO_2-emissions generated by the combustion of HFO and LFO are as follows:

CO_2[t] = 1.564.392 t CO_2 + 885 t CO_2 = **1.565.277 t CO_2**

Benchmark

1.565.277 t CO_2 / 2.293.410 MWh = 0,683 t CO_2 / MWh = **0,683 kg CO_2 / kWh**

3.2.2 Moni Power Station

The on site assessment has taken place on Tuesday March 6th, 2007. The amount of fuel streams (HFO, LFO) used in 2006 and archived by the operator has been verified as follows (details see following lists):

- Consumption of HFO in 2006: 149.894,622 t
- Consumption of LFO in 2006: 6.576,669 t

Date	Delivery HFO (Heavy Fuel Oil) [t]	Carbon Content* [kg C / kg HFO]
18.01.2006	13.363,673	0,8614
03.022006	8.525,577	0,8650
18.02.2006	14.879,097	0,8694
16.04.2006	14.994,639	0,8715
04.06.2006	15.700,238	0,8675
28.06.2006	11.028,043	0,8815
04.08.2006	8.045,821	0,8605
19.08.2006	18.929,563	0,8752
21.09.2006	16.919,566	0,8778
19.10.2006	15.972,275	0,8802
14.12.2006	16.072,210	0,8769
Total delivery 2006	**154.430,702**	**mass weighted average 0,8724**
Stock 01.01.2006	**+ 22.778,325**	
Stock 31.12.2006	**- 27.314,405**	
Consumption 2006	**149.894,622**	

*measured by ITS Testing Services Ltd. (London) accredited for Elemental Analysis (Carbon, Hydrogen and Nitrogen ASTM D5291-02) according to ISO 17025 (United Kingdom Accreditation Services, Issue No. 021, Issue Date March 6th, 2006)

Date	Delivery LFO (Diesel), [t]		Date	Delivery LFO (Diesel), [t]
03.01.2006	390,659		12.07.2006	430,395
04.01.2006	273,969		24.08.2006	396,370
05.01.2006	152,205		25.08.2006	227,914
09.01.2006	121,812		28.08.2006	293,353
10.01.2006	91,359		30.08.2006	275,811
21.03.2006	316,289		31.08.2006	305,641
22.03.2006	339,660		31.10.2006	481,504
28.03.2006	310,263		01.11.2006	391,877
29.03.2006	385,399		06.11.2006	234,123
30.03.2006	232,679		07.11.2006	140,901
05.04.2006	362,615		08.11.2006	110,395
06.04.2006	412,722		04.12.2006	208,019
07.04.2006	76,715		**Delivery 2006**	**8.028,645**
03.07.2006	202,843		**Stock 01.01.2006**	**+5.927,643**
04.07.2006	277,758		**Stock 31.12.2006**	**-7.379,619**
05.07.2006	252,226		**Consumption 2006**	**6.576,669**
11.07.2006	333,169			

The delivery records of HFO and LFO have been checked by the verifier. The operator has additionally declared and signed that the above listed figures of fuel deliveries during the year 2006 to Moni Power Station are complete, i.e. no other fuel streams have been used for combustion purpose within the power station.

The delivery of HFO (Heavy Fuel Oil) has been recorded analogous to 2005 /14/ and has considered the influence of temperature on density and thus on mass of HFO. For each batch a delivery record signed by the power station manager and a representative of the fuel supplier has been presented.

Temperature has been measured with an accuracy of ± 0,25°C, i.e. related to a average temperature of 35°C the accuracy is ± 0,7%.

Dips and ullages have been measured with an accuracy of ± 1 mm, i.e. related to an average net dip (accepted gross dip after receipt – accepted gross dip before receipt) of about 8 m the accuracy is ± 0,0125%.

The HFO-stocks at the beginning and at the end of the year 2006 have been recorded by the operator. The values could be verified in operational log books. The accuracy corresponds to the measurements of dips and ullages.

The operator has provided evidence for the delivery of LFO (Diesel) by corresponding delivery records and invoices of the fuel supplier (Petrolina Holdings Ltd. Larnaca). However the complete and signed documentation was only available at the EAC headquarter (see also chapter 3.3.2). The accuracy of the measuring device of the fuel supplier (SMITH METER with Serial No. 18DJ-11100 and 18DJ-111022) 7 is significantly lower than 1,0% (Meter Proving by Hellenic Technical Enterprises Ltd., date of calibration 05.10.2006). The LFO-stream is a minor stream of the installation.

The inventory LFO-stocks at the beginning and at the end of the year 2006 have been recorded by the operator. The values could be verified in operational log books. The accuracy corresponds to the measurements of dips and ullages.

Annual CO_2-emissions:

In 2005 the carbon content of the fuel streams (HFO and LFO) could be calculated with a constant default value of 0,85 kg CO_2 per kg fuel. However, in the year 2006 (and 2007) the annual CO_2-emissions generated by the combustion of HFO shall be calculated - according to the GHG-permit - with an analytical determined value of the carbon content. A mass weighted average of 87,24% has been determined by an independent laboratory.

Thus the annual CO_2-emissions generated by the combustion of HFO in the year 2006 are as follows:

CO_2[t] = (mass of fuel) x (carbon content) x (molecular weight of CO_2/atomic weight of C) x oxidation factor

mass of fuel = mass of HFO = 149.894,622 t

carbon content = 0,8724 t C / t fuel

molecular weight of CO_2/atomic weight of C = 44 / 12 = 3,667

oxidation factor = 0,995

CO_2[t] = 149.894,622 x 0,8724 x (44/12) x 0,995 t CO_2 = **477.086 t CO_2**

As the annual CO_2-emissions generated by the combustion of LFO can be calculated according to a decision of the Competent Authority also for the year 2006 with a default value for the carbon content of 85% the calculation is as follows:

CO_2[t] = (mass of fuel) x (carbon content) x (molecular weight of CO_2/atomic weight of C) x oxidation factor

mass of fuel = mass of LFO = 6.576,669 t

carbon content = 0,85 t C / t fuel

molecular weight of CO_2/atomic weight of C = 44 / 12 = 3,667

oxidation factor = 0,995

CO_2[t] = 6.576,669 x 0,85 x (44/12) x 0,995 t CO_2 = **20.395 t CO_2**

The total CO_2-emissions generated by the combustion of HFO and LFO are as follows:

CO_2[t] = 477.086 t CO_2 + 20.395 t CO_2 = **497.481 t CO_2**

Benchmark

497.481 t CO_2 / 463.888 MWh = 1,072 t CO_2 / MWh = **1,072 kg CO_2 / kWh**

3.2.3 Dhekelia Power Station

The on site assessment has taken place on Wednesday March 7th, 2007. The amount of fuel streams (HFO) used in 2006 and archived by the operator has been verified as follows (details see following lists):

- Consumption of HFO in 2006: 500.442,975 t

Date	Delivery HFO (Heavy Fuel Oil) [t]	Carbon Content [kg C / kg HFO]
08.01.2006	25.941,318	0,8691
17.01.2006	10.561,544	0,8614
30.01.2006	21.971,070	0,8650
17.02.2006	25.973,905	0,8670
20.02.2006	21.304,006	0,8694
12.03.2006	25.943,305	0,8672
18.04.2006	25.629,646	0,8715
05.05.2006	29.421,071	0,8601
02.06.2006	22.330,651	0,8675
18.06.2006	27.584,936	0,8589
26.06.2006	13.974,929	0,8815
26.07.2006	33.778,030	0,8679
02.08.2006	19.193,033	0,8605
13.08.2006	37.625,478	0,8698
21.08.2006	13.823,873	0,8752
10.09.2006	27.840,940	0,8700
23.09.2006	15.379,022	0,8778
11.10.2006	32.918,472	0,8715
21.10.2006	16.887,238	0,8802
18.11.2006	34.892,862	0,8746
16.12.2006	14.824,384	0,8769
Total delivery 2006	**497.799,713**	**mass weighted average 0,8712**
Stock 01.01.2006	**+ 51.390,483**	
Stock 31.12.2006	**-48.747,221**	
Consumption 2006	**500.442,975**	

The carbon content was measured by ITS Testing Services Ltd. (London) accredited for Elemental Analysis (Carbon, Hydrogen and Nitrogen ASTM D5291-02) according to ISO 17025 (United Kingdom Accreditation Services, Issue No. 021, Issue Date March 6th, 2006).

The delivery records of HFO have been checked by the verifier. The operator has additionally declaredand signed that the above listed figures of fuel deliveries during the year 2006 to Dhekelia Power Station are complete, i.e. no other fuel streams have been used for combustion purpose within the power station.

The delivery of HFO (Heavy Fuel Oil) has been recorded analogous 2005 /14/ and has considered the influence of temperature on density and thus on mass of HFO. For each batch a delivery record signed by the power station manager and a representative of the fuel supplier has been presented.

Temperature has been measured with an accuracy of ± 0,25°C, i.e. related to a average temperature of 35°C the accuracy is ± 0,7%.
Dips and ullages have been measured with an accuracy of ± 1 mm, i.e. related to an average net dip (accepted gross dip after receipt – accepted gross dip before receipt) of about 8 m the accuracy is ± 0,0125%.

The HFO-stocks at the beginning and at the end of the year 2006 have been recorded by the operator. The values could be verified in operational log books. The accuracy corresponds to the measurements of dips and ullages.

Annual CO_2-emissions:

In 2005 the carbon content of the fuel stream (HFO) could be calculated with a constant default value of 0,85 kg CO_2 per kg fuel. However, in the year 2006 (and 2007) the annual CO_2-emissions generated by the combustion of HFO shall be calculated - according to the GHG-permit - with an analytical determined value of the carbon content. A mass weighted average of 87,12% has been determined by an independent laboratory.

Thus the annual CO_2-emissions generated by the combustion of HFO in the year 2006 are as follows:

CO_2[t] = (mass of fuel) x (carbon content) x (molecular weight of CO_2/atomic weight of C) x oxidation factor

mass of fuel = mass of HFO = 500.442,975 t

carbon content = 0,8712 t C / t fuel

molecular weight of CO_2/atomic weight of C = 44 / 12 = 3,667

oxidation factor = 0,995

CO_2[t] = 500.442,975 x 0,8712 x (44/12) x 0,995 t CO_2 = **1.590.622 t CO_2**

Benchmark

1.590.622 t CO_2 / 1.860.781 MWh = 0,855 t CO_2 / MWh = **0,855 kg CO_2 / kWh**

3.3 Risk analysis

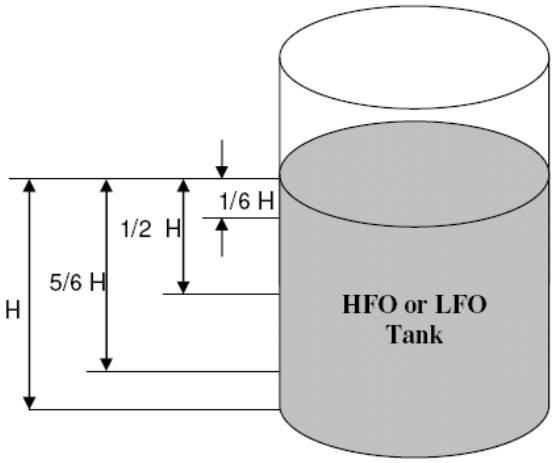
The only source for CO_2-emissions in all three power stations is the combustion process with two fuel streams (HFO and LFO in case of Vasilikos and Moni Power Station) respectively only one fuel stream in case of Dhekelia Power Station. Therefore the complexity of all three power stations is low.

Nevertheless key procedures (e.g. monitoring, reporting and data management including achieving) and special procedures (e.g. monitoring of dirty Diesel at Vasilikos power station) have to be documented in more detail (e.g. in corresponding procedural and work descriptions) by the operator to ensure correct and reproducible data management including quality assurance and quality control according to the MRG. The operator has to clarify and document, which part of the data management including QA/QC will be provided in the responsibility of the power station staff and which part is handled in the responsibility of the headquarter staff [**(CI 01)** see also 3.3.1 and 3.3.2].

The amount of HFO will be influenced by the temperature, as a higher temperature will increase the volume and thus the level in the HFO tanks. Therefore temperature measurements are part of the unloading process and accompanied by EAC and a representative of the fuel supplier. The standard measurement procedure is as follows (see also following picture):

Three samples were taken out of a tank from different heights

- 1/6 of the height H
- 1/2 of the height H and
- 5/6 of the height H.



After having taken the samples the temperature is measured by a mercury thermometer. Although this procedure is accepted by fuel supplier and EAC, a new on-line temperature measurement is under investigation at Dhekelia Power Station. During next year verification in early 2008 the results of this on-line measurement should be presented by EAC **(CI 02)**.

3.3.1 Vasilikos Power Station

Due to the cleaning process of the unloading HFO pipeline a certain amount of LFO (Diesel) is transferred to the HFO tank. Data management has to monitor and document this transfer in a transparent manner to avoid any double counting or no counting. The documentation, respectively the interpretation of the data was different between EAC-Headquarter and power station staff. The headquarters correct data documentation and interpretation has to be implemented also at the power station **(CAR 01)**. This CAR will be verified during next year verification in case that this part of the data management will remain in the responsibility of the power station staff.

3.3.2 Moni Power Station

Data management concerning the delivery of LFO shows deficits: incomplete delivery records and missing signatures. However, the complete documentation including all signatures was available in EACs headquarter. The documentation of the audited office (power station or headquarter) has to comply with the requirements of the MRG, i.e. has to be complete and reliable **(CAR 02)**. This CAR will be verified during next year verification.

3.3.3 Dhekelia Power Station

As part of the power station an emergency power supply has been implemented, which, however, is not mentioned in the GHG-Permit and in the approved Monitoring Plan. During 2006 the engine has been started twice a month for about 5 minutes in order to check its function. The corresponding LFO consumption and CO_2 emission can be estimated in a conservative manner as follows:

- 5 min/check x 2 checks/months x 12 months/year x 0,3 m^3/(60 min) = 0,6 m^3
- 0,6 m^3 x 0,835 t/m^3 x 0,85 x 3,667 x 0,995 = **1,6 t CO_2**

In relation to the total CO_2 emissions of the power plant a relative error of **0,0001 %** may occur, which, however, is negligible.

Assumed that the emergency unit will run a complete year (which is an unrealistic worst case approach) the error will be still lower than 0,4%:

- 8.760 h/a x 0,3 m^3/h = 2.628 m^3
- 2.628 m^3 x 0,835 t/m^3 x 0,85 x 3,667 x 0,995 = **6.805 t CO_2**

Nevertheless the operator has to clarify with the Competent Authority, whether the emergency unit has to be considered in monitoring and reporting procedures (GHG-permit and MP) **(CL03).** This clarification will be verified during next year verification.

4. Annual Comparison

The total annual CO_2-emissions have been increased from 2005 to 2006 by about 180.000 t (5,2%). As the allocated number per year has also been increased the excess allowances have been reduced to about 200.000 t (see following table).

	2005	2006	(2006-2005)
Allocated amount [t CO_2]	3.752.240	3.866.217	+113.977
Emitted amount [t CO_2]	3.471.844	3.653.380	+181.536
Surplus (+) / shortages (-) [t CO_2]	+280.396	+212.837	-67.559

In the following tables a detailed annual comparison is given for the three power stations. Vasilikos Power Station is responsible for the increase in CO_2-emissions in 2006, whereas the other two power stations (Moni, Dhekelia) have emitted less CO_2.

	Parameter	2005	2006	(2006-2005)
Vasilikos Power Station	Total installed capacity [MW]	428	428	±0
	Total CO_2-emissions [t]	1.245.389	1.565.277	+319.888
	Oxidation factor	0,995	0,995	±0
	Benchmark [kg CO_2/kWh]	0,672	0,683	+0,011
	Heavy Fuel Oil (HFO) [t]	400.128,439	486.936,465	+86.808,026
	NCV of HFO [TJ/t x 10^{-6}]	40.652	41.048	+396
	Carbon content HFO [%]	85,00	88,06	±0
	CO_2-emissions HFO [t]	1.240.832	1.564.392	+323.560
	Diesel [t]	1.469,526	285,410	-1.184,116
	NCV of Diesel [TJ/t x 10^{-6}]	42.700	43.101	401
	Carbon content Diesel [%]	85,00	85,00	±0
	CO_2-emissions Diesel [t]	4.557	885	-3672

	Parameter	2005	2006	(2006-2005)
Moni Power Station	Total installed capacity [MW]	330	330	±0
	Total CO_2-emissions [t]	610.670	497.481	-1.108.151
	Oxidation factor	0,995	0,995	±0
	Benchmark [kg CO_2/kWh]	1,073	1,072	-0,001
	Heavy Fuel Oil (HFO) [t]	182.075,028	149.894,622	-331.969,650
	NCV of HFO [TJ/t x 10^{-6}]	40.300	40.300	±0
	Carbon content HFO [%]	85,00	87,24	+2,24
	CO_2-emissions HFO [t]	564.630	477.086	-87.544
	Diesel [t]	14.846,362	6.576,669	-8.269,693
	NCV of Diesel [TJ/t x 10^{-6}]	42.826	42.826	±0
	Carbon content Diesel [%]	85,00	85,00	±0
	CO_2-emissions Diesel [t]	46.040	20.395	-25.645

	Parameter	2005	2006	(2006-2005)
Dhekelia Power Station	Total installed capacity [MW]	360	360	±0
	Total CO_2-emissions [t]	1.615.785	1.590.622	-25.163
	Oxidation factor	0,995	0,995	±0
	Benchmark [kg CO_2/kWh]	0,839	0,855	+0,016
	Heavy Fuel Oil (HFO) [t]	521.038,787	500.442,975	-20.595,812
	NCV of HFO [TJ/t x 10^{-6}]	40.408	40.541	133
	Carbon content HFO [%]	85,00	87,12	2,12
	CO_2-emissions HFO [t]	1.615.785	1.590.622 t	-25.163

5. Verification Opinion

The annual CO_2-emissions have been monitored and reported according to the legal requirements (GHG Permits and approved Monitoring Plans). The verified total emissions of the three power stations including their product-specific benchmarks (kg CO_2 / kWh) are summarized in the following table:

Power Station	**CO_2-emissions 2005 [t CO_2]**	**Benchmark (specific CO_2-emissions) [kg CO_2 / kWh]**
Vasilikos Power Station	1.565.277	0,683
Moni Power Station	497.481	1,072
Dhekelia Power Station	1.590.622	0,855
Sum (Σ) respectively average (∅)	Σ 3.653.380	∅ 0,791

The operator has proven sufficient evidence that these CO_2-figures are free of misstatements, omissions and material error.

Cologne, March 14th, 2007

Prof. Dr. Günter Schock
- Verifier -

Annex 1

Electricity Authority of Cyprus

Greenhouse Gas Emissions Report for 2006

according to the

Commissions´s Decision of the 29th of January 2004
establishing guidelines for the monitoring and reporting of greenhouse gas emissions

pursuant to the

Directive 2003/87/EC of the European Parliament and of the Council of the 23rd of October 2003 establishing a scheme for greenhouse gas emission allowance trading
within the Community

February 2007

Greenhouse Gas Emissions Report for 2006

1.0 EXECUTIVE SUMMARY

According to Article 14 of the Emissions Trading Directive 2003/87/EC, each operator of an installation must report the emissions from that installation during each calendar year to the competent authority after the end of that year in accordance with the guidelines established by the Commission's Decision of the 29th January 2004.

In 2006 the Electricity Authority of Cyprus operated three thermal Power Stations with a total installed capacity of 1118 MW. ***Moni*** Power Station consists of 6 x 30 MW steam turbines and 4 x 37,5 MW gas turbines. ***Dhekelia*** Power Station consists of 6 x 60 MW steam turbines. Both stations use heavy fuel oil (HFO) with sulphur content of less than 2% for the steam plant and gasoil with sulphur content of 0,2% for the gas turbine plant. ***Vasilikos*** Power Station consists of 3 x 130 MW steam turbines and 1 x 38 MW gas turbine. The station uses heavy fuel oil with a sulphur content of 1% for the steam units and gasoil with sulphur content of 0,2% for the gas turbine plant.

The Electricity Authority of Cyprus has already received greenhouse gas emission permits for the above three Power Stations from the Competent Authority with all allowances allocated to the stations as per Commission's Decision dated 27th of December 2004. The three permits have the following register numbers: For Vasilikos Power Station CY-ET01/1, for Moni Power Station CY-ET02/1 and for Dhekelia Power Station CY-ET03/1.

This report, which was prepared in accordance with the Commission's guidelines, presents the carbon dioxide emissions for 2006 from each Power Station. This report is subjected to verification before submitted to the Competent Authority. For this purpose the Electricity Authority of Cyprus have employed TUV of Germany (TUV Rheinland Group) as official verifiers to carry out all necessary verification work.

2.0 GREENHOUSE GAS EMISSION REPORT FOR VASILIKOS PS

2.1 Identification of Installation

Name of parent company	**Electricity Authority of Cyprus**

Name of installation	**Vasilikos Power Station**

Operator of installation	**Electricity Authority of Cyprus**

Name / Identifier of Installation	**Vasilikos Power Station**
Address	**PO BOX 54294 LIMASSOL 3722 CYPRUS**

Greenhouse Gas Emissions Permit Number	**CY – ET01/1**
NAP Code	**ET01/1**
Installation Ref. Number	**ET001**

Name of Contact Person	**Mr. Charis Menelaou**
Position within Operator Company (as applicable)	**Assistant Manager (Generation)**
Address	**Electricity Authority of Cyprus Head Office 11 Amfipoleos Street Strovolos PO BOX 24506 CY-1399 NICOSIA CYPRUS**
Telephone Number	**+357 22 201513**
Fax	**+357 22 201509**
e-mail	**cmenelao@eac.com.cy**

Reporting Year	**2006**

Category of activity	**Energy**

2.2 Activities at the Site: Technical Details

2.2(a) Vasilikos Power Station Installation and Production Unit Details ET001

Emission Point Reference Number	Installation Name	Production Unit Type/Technology	Description of Emission Point	Description of Activity	Installed Capacity	Capacity Units
EP A1-01	Power Generating Plant	Steam Turbine	Boiler 1 - Stack (A)	Combustion installation	130	MW
EP A1-02	Power Generating Plant	Steam Turbine	Boiler 2 - Stack (B)	Combustion installation	130	MW
EP A1-03	Power Generating Plant	Steam Turbine	Boiler 3 - Stack (C)	Combustion installation	130	MW
EP A1-03	Power Generating Plant	Steam Turbine	Boiler 3 - Stack (C)	Combustion installation	130	MW
EP A1-04	Power Generating Plant	Gas Turbine	Gas Turbine - Stack (D)	Combustion installation	38	MW
TOTAL INSTALLED CAPACITY					**428**	**MW**

2.2.(b) Required Tiers

Emission source	Fuel/material stream	Required tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 1	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.

2.2.(c) Applied Tiers

Emission source	Fuel/material stream	Applied tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 1	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.

Tables 2.2.(b) and 2.2.(c) verify that all applied tiers are according to the required tiers as stated in the Monitoring and Reporting Guidelines.

2.3 Overview of CO_2 emissions within the installation for 2006

According to Annex IV of the Directive 2003/87/EC emissions are monitored either by calculation or on the basis of measurement.

Calculations of emissions were carried out using the formula:

CO_2 emissions = Activity data x Emission factor x Oxidation factor

Activity Data

According to MRG activity data is expressed as the net energy content of the fuel consumed [TJ] during the reporting data. The energy content of the fuel consumption shall be calculated by means of the following formula:

Energy content of fuel consumption [TJ] =
Fuel consumed [tons] x Net calorific value of fuel [TJ/t]

In order to calculate the fuel consumed the appropriate tier was used. The fuel consumption is calculated using a mass balance approach based on the quantity of fuel purchased and the difference in the quantity held in stock over a period of time using the following formula:

Fuel C = Fuel P + (Fuel S – Fuel E) – Fuel O

where:

Fuel C: Fuel combusted during the reporting period
Fuel P: Fuel purchased during the reporting period
Fuel S: Fuel stock at the beginning of the reporting period
Fuel E: Fuel stock at the end of the reporting period
Fuel O: Fuel used for other purposes (Transportation or re-sold)

2.3.(a) Total Fuel Oil Consumed (t) for the year 2006

Year	Vasilikos P/S HFO (t)	Vasilikos P/S Diesel (t)
2006	486.936,465	285,410

2.3.(b) Net calorific value NCF (TJ/t) for the year 2006

Year	Vasilikos P/S NCF for HFO (TJ/t) x 10^{-6}	Vasilikos P/S NCF for Diesel Oil (TJ/t) x 10^{-6}
2006	41.048	43.101

Emission factor

A value of 88,06% carbon content in heavy fuel oil was used. This is the average value measured by an independent laboratory for the 11 deliveries of heavy fuel oil received in 2006.

A default value of 85,0% carbon content in diesel oil was used. It is confirmed that the Ministry of Agriculture, Natural Resources and Environment which is the Competent Authority for the implementation of the Emissions Trading Directive, has accepted the default value of 85% carbon content in diesel oil for purposes of calculating the total carbon dioxide emissions for 2006.

Oxidation factor

According to MRG an oxidation factor of 0,995 was used.

Total CO_2 emissions (Heavy Fuel Oil)

CO_2 emissions (Heavy Fuel Oil for 2006) = 1.564.392 tons

Total CO_2 emissions (Diesel Oil)

CO_2 emissions (Diesel Oil for 2006) = 885 tons

From the above data it can be seen that the emissions from the steam units burning HFO represent 99,94% of the total emissions whereas the corresponding emissions from the gas turbine burning Diesel Oil represent only 0,06% of the total emissions. As a result of the above the three steam units are regarded as major sources whereas the gas turbine as a minor (de minimis) source.

Total CO_2 emissions (Heavy Fuel oil +Diesel Oil)

Total CO_2 emissions from Vasilikos Power Station for 2006 = 1.565.277 tons

3.0 GREENHOUSE GAS EMISSION REPORT FOR DHEKELIA PS

3.1 Identification of Installation

Name of parent company	**Electricity Authority of Cyprus**

Name of installation	**Dhekelia Power Station**

Operator of installation	**Electricity Authority of Cyprus**

Name / Identifier of Installation	**Dhekelia Power Station**
Address	**PO BOX 40113 LARNACA 6301 CYPRUS**

Greenhouse Gas Emissions Permit Number	**CY – ET03/1**
NAP Code	**ET01/1**
Installation Ref. Number	**ET003**

Name of Contact Person	**Mr. Charis Menelaou**
Position within Operator Company (as applicable)	**Assistant Manager (Generation)**
Address	**Electricity Authority of Cyprus Head Office 11 Amfipoleos Street Strovolos PO BOX 24506 CY-1399 NICOSIA CYPRUS**
Telephone Number	**+357 22 201513**
Fax	**+357 22 201509**
e-mail	**cmenelao@eac.com.cy**

Reporting Year	**2006**

Category of activity	**Energy**

3.2 Activities at the Site: Technical Details

3.2(a) Dhekelia Power Station Installation and Production Unit Details ET003

Emission Point Reference Number	Installation Name	Production Unit Type/Technology	Description of Emission Point	Description of Activity	Installed Capacity	Capacity Units
EP A3-01	Power Generating Plant	Steam Turbine	Boiler 1 – Stack(A)	Combustion installation	60	MW
EP A3-02	Power Generating Plant	Steam Turbine	Boiler 2 – Stack(B)	Combustion installation	60	MW
EP A3-03	Power Generating Plant	Steam Turbine	Boiler 3 – Stack(C)	Combustion installation	60	MW
EP A3-04	Power Generating Plant	Steam Turbine	Boiler 3 – Stack(D)	Combustion installation	60	MW
EP A3-04	Power Generating Plant	Steam Turbine	Boiler 3 – Stack(D)	Combustion installation	60	MW
EP A3-05	Power Generating Plant	Steam Turbine	Boiler 5 – Stack(E)	Combustion installation	60	MW
EP A3-06	Power Generating Plant	Steam Turbine	Boiler 6 – Stack(F)	Combustion installation	60	MW
TOTAL INSTALLED CAPACITY					**360**	**MW**

3.2.(b) Required Tiers

Emission source	Fuel/material stream	Required tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 4	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 5	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 6	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.

3.2.(c) Applied Tiers

Emission source	Fuel/material stream	Applied tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 4	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 5	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 6	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.

Tables 3.2.(b) and 3.2.(c) verify that all applied tiers are according to the required tiers as stated in the Monitoring and Reporting Guidelines.

3.3 Overview of CO2 emissions within the installation for 2006

According to Annex IV of the Directive 2003/87/EC emissions are monitored either by calculation or on the basis of measurement.

Calculations of emissions were carried out using the formula:

CO_2 emissions = Activity data x Emission factor x Oxidation factor

Activity Data

According to MRG activity data is expressed as the net energy content of the fuel consumed [TJ] during the reporting data. The energy content of the fuel consumption shall be calculated by means of the following formula:

Energy content of fuel consumption [TJ] =
Fuel consumed [tons] x Net calorific value of fuel [TJ/t]

In order to calculate the fuel consumed the appropriate tier is used. The fuel consumption is calculated using a mass balance approach based on the quantity of fuel purchased and the difference in the quantity held in stock over a period of time using the following formula:

Fuel C = Fuel P + (Fuel S – Fuel E) – Fuel O

where:

Fuel C: Fuel combusted during the reporting period
Fuel P: Fuel purchased during the reporting period
Fuel S: Fuel stock at the beginning of the reporting period
Fuel E: Fuel stock at the end of the reporting period
Fuel O: Fuel used for other purposes (Transportation or re-sold)

The calculated values for the year 2006 are expressed in tons.

Fuel (2006) = [497.799,713 + (51.390,483 – 48.747,221) – 0] = 500.442,975 tons

3.3.(a) Total Fuel Oil Consumed (t) for the year 2006

Year	Dhekelia P/S HFO (t)
2006	500.442,975

3.3.(b) Net calorific value NCF (TJ/t) for the year 2006

Year	Dhekelia P/S NCF for HFO (TJ/t) x 10^{-6}
2006	40.541

Emission factor

A value of 87,12% carbon content in heavy fuel oil was used. This is the average value measured by an independent laboratory for the 21 deliveries of heavy fuel oil received in 2006.

Oxidation factor

According to MRG an oxidation factor of 0,995 was used.

Total CO_2 emissions

Total CO_2 emissions from Dhekelia Power Station for 2006 = 1.590.622 tons

From the above data it can be seen that the emissions from the steam units burning HFO represent 100,00% of the total emissions from the station and as a result the six steam units are regarded as major sources.

4.0 GREENHOUSE GAS EMISSION REPORT FOR MONI PS

4.1 Identification of Installation

Name of parent company	**Electricity Authority of Cyprus**

Name of installation	**Moni Power Station**

Operator of installation	**Electricity Authority of Cyprus**

Name / Identifier of Installation	**Moni Power Station**
Address	**PO BOX 50471 LIMASSOL 3605 CYPRUS**

Greenhouse Gas Emissions Permit Number	**CY – ET02/1**
NAP Code	**ET01/1**
Installation Ref. Number	**ET002**

Name of Contact Person	**Mr. Charis Menelaou**
Position within Operator Company (as applicable)	**Assistant Manager (Generation)**
Address	**Electricity Authority of Cyprus Head Office 11 Amfipoleos Street Strovolos PO BOX 24506 CY-1399 NICOSIA CYPRUS**
Telephone Number	**+357 22 201513**
Fax	**+357 22 201509**
e-mail	**cmenelao@eac.com.cy**

Reporting Year	**2006**

Category of activity	**Energy**

4.2 Activities at the Site: Technical Details

4.2(a) Moni Power Station Installation and Production Unit Details ET002

Emission Point Reference Number	Installation Name	Production Unit Type/Technology	Description of Emission Point	Description of Activity	Installed Capacity	Capacity Units
EP A2-01	Power Generating Plant	Steam Turbine	Boiler 1 – Stack (A)	Combustion installation	30	MW
EP A2-02	Power Generating Plant	Steam Turbine	Boiler 2 – Stack (B)	Combustion installation	30	MW
EP A2-03	Power Generating Plant	Steam Turbine	Boiler 3 – Stack (C)	Combustion installation	30	MW
EP A2-04	Power Generating Plant	Steam Turbine	Boiler 4 – Stack (D)	Combustion installation	30	MW
EP A2-05	Power Generating Plant	Steam Turbine	Boiler 5 – Stack (E)	Combustion installation	30	MW
EP A2-06	Power Generating Plant	Steam Turbine	Boiler 6 – Stack (F)	Combustion installation	30	MW
EP A2-07	Power Generating Plant	Gas Turbine	Gas Turbine 1 – Stack (G)	Combustion installation	37,5	MW
EP A2-08	Power Generating Plant	Gas Turbine	Gas Turbine 2 – Stack (H)	Combustion installation	37,5	MW
EP A2-09	Power Generating Plant	Gas Turbine	Gas Turbine 3 – Stack (I)	Combustion installation	37,5	MW
EP A2-10	Power Generating Plant	Gas Turbine	Gas Turbine 4 – Stack (J)	Combustion installation	37,5	MW
TOTAL INSTALLED CAPACITY					**330**	**MW**

4.2.(b) Required Tiers

Emission source	Fuel/material stream	Required tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 4	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 5	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 6	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 1	Fuel (Diesel Oil)	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 2	Fuel (Diesel Oil)	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 3	Fuel (Diesel Oil)	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 4	Fuel (Diesel Oil)	4b	3	3	n.a.	1	n.a.

4.2.(c) Applied Tiers

Emission source	Fuel/material stream	Applied tier (tier number corresponding to monitoring and reporting guidelines as applicable)					
		Activity data	Net calorific value	Emission factor	Composition data	Oxidation factor	Conversion factor
Boiler No. 1	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 2	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 3	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 4	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 5	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Boiler No. 6	Heavy Fuel Oil	4b	3	3	n.a.	1	n.a.
Gas Turbine No. 1	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.
Gas Turbine No. 2	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.
Gas Turbine No. 3	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.
Gas Turbine No. 4	Fuel (Diesel Oil)	2b	2	2b	n.a.	1	n.a.

Tables 4.2.(b) and 4.2.(c) verify that all applied tiers are according to the required tiers as stated in the Monitoring and Reporting Guidelines.

4.3 Overview of CO_2 emissions within the installation for 2006

According to Annex IV of the Directive 2003/87/EC emissions are monitored either by calculation or on the basis of measurement.

Calculations of emissions were carried out using the formula:

CO_2 emissions = Activity data x Emission factor x Oxidation factor

Activity Data

According to MRG activity data is expressed as the net energy content of the fuel consumed [TJ] during the reporting data.

The energy content of the fuel consumption shall be calculated by means of the following formula:

Energy content of fuel consumption [TJ] =
Fuel consumed [tons] x Net calorific value of fuel [TJ/t]

In order to calculate the fuel consumed the appropriate tier is used. The fuel consumption is calculated using a mass balance approach based on the quantity of fuel purchased and the difference in the quantity held in stock over a period of time using the following formula:

Fuel C = Fuel P + (Fuel S – Fuel E) – Fuel O

where:

Fuel C: Fuel combusted during the reporting period
Fuel P: Fuel purchased during the reporting period
Fuel S: Fuel stock at the beginning of the reporting period
Fuel E: Fuel stock at the end of the reporting period
Fuel O: Fuel used for other purposes (Transportation or re-sold)

The calculated values for the year 2006 are expressed in tons.

Heavy Fuel (2006) = [154.430,702 + (22.778,325 – 27.314,405) – 0]
= 149.894,622 tons

Fuel (Diesel Oil) (2006) = [8.028,645 + (5.927,643 – 7.379,619) – 0]
= 6.576,669 tons

4.3.(a) Total Fuel Oil Consumed (t) for the year 2006

Year	Moni P/S HFO (t)	Moni P/S Diesel (t)
2006	149.894,622	6.576,669

4.3.(b) Net calorific value NCF (TJ/t) for the year 2006

Year	Moni P/S NCF for HFO (TJ/t) x 10^{-6}	Moni P/S NCF for Diesel (TJ/t) x 10^{-6}
2006	40.300	42.826

Emission factor

A value of 87,24% carbon content in heavy fuel oil was used. This is the average value measured by an independent laboratory for the 11 deliveries of heavy fuel oil received in 2006.

A default value of 85,0% carbon content in diesel oil was used. It is confirmed that the Ministry of Agriculture, Natural Resources and Environment which is the Competent Authority for the implementation of the Emissions Trading Directive, has accepted the default value of 85% carbon content in diesel oil for purposes of calculating the total carbon dioxide emissions for 2006.

Oxidation factor

According to MRG an oxidation factor of 0,995 was used.

Total CO_2 emissions (Heavy Fuel Oil)

CO_2 emissions (Heavy Fuel Oil for 2006) = 477.086 tons

Total CO_2 emissions (Diesel Oil)

CO_2 emissions (Diesel Oil for 2006) = 20.395 tons

From the above data it can be seen that the emissions from the steam units burning HFO represent 95,90% of the total emissions whereas the corresponding emissions from the gas turbine burning Diesel Oil represent 4,10% of the total emissions. As a result of the above the six steam units as well as the four gas turbines are regarded as major sources.

Total CO_2 emissions (Heavy Fuel oil +Diesel Oil)

Total CO_2 emissions from Moni Power Station for 2006 = 497.481 tons