Joint Implementation
PROJECT DESIGN DOCUMENT
Version 11 - 30 June 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Bulgarian Energy Efficiency Project Portfolio

A.2. Description of the project activity:

Improving energy efficiency is usually a “win-win” strategy. It saves consumers and businesses money, it reduces the need for costly and controversial new power plants, it increases the reliability of the energy supply, it decreases pollution emissions and it can lower energy imports, if any.

There is a tremendous potential for improvement in energy efficiency in Bulgaria, where energy consumption relative to the GDP is more than seven times the average of OECD member countries. The same index, if expressed in purchase power parity of the country currency is close to 2 times, and expressed in natural production volumes is on 30 to 60% the average of OECD.

The proposed project aims to save energy and to increase the efficiency of the energy producing facilities in the Sugar Plant, Zebra and Pirinplast. The construction time is presented in the table below:

Project name	Construction starting date	Completion date
Sugar Plants	May 2004	Stage 1- October 2005, stage 2 – October 2006
Zebra	July 2004	Expected October 2006
Pirinplast	March 2005	June 2005

The total GHG emission reduction is calculated from the amount of fuel saved and/or electricity saved as a result from the project scenario compared with the situation when the project would not have take place (2005-2012).

Project name	T CO_{2eq}
Sugar Plants JSC	59,755
Zebra JSC	52,157
Pirinplast	17,686

1 Sugar Plants JSC

The project involves two sub projects:

i. ECO 1 - reconstruction and improvement of energy efficiency of an existing coal fired steam boiler (PK-35-39 No. 3), used for steam and electricity production

ii. ECO 2 - establishment of two heat exchangers for heating, utilizing the output steam of installed new back pressure steam turbine and though increasing the quantity of the co-generated electricity.

Ad. (i)

The reconstruction of the boiler will lead to increase in 20% of power generation efficiency and subsequently, to reduction of coal consumption. The installed gas-oil burners with bigger efficiency, working on heavy fuel oil and natural gas, will replace the old and inefficient boiler with heavy oil burners. As a result of the reconstruction of the boiler, the annual consumption of coal will decrease by 5,479 tonnes per year and of heavy fuel oil by 200 tonnes annually. This will be compensated by an increased natural gas consumption of 219,000 nm^3 per annum (on basis of 2,820 operational hours).

Ad. (ii)
As a result of the construction of two new heat exchangers supplied with steam by a counter pressure turbine (type PR 6-35/5/12M) (ECO 2), the efficiency of the co-generation cycle improves, since the waste heat is used. The steam from the turbine will supply the heat exchangers and transform the waste steam into heating energy with hot water. Energy losses within the sugar plant will decrease since part of the heat energy will be transported with a hot water that is a better energy carrier than steam. The heat exchangers construction leads to immediate reflow of the condensate to the purified water and to a further decrease of coal consumption and of chemically-purified water by 470 tonnes and 27,123 tonnes respectively, at an annual heat exchanger capacity utilization of 2,820 hours. The total balance of the emission reductions in the crediting period is presented in the table below.

EMISSION REDUCTIONS:										
Scenario	Unit	2005	2006	2007	2008	2009	2010	2011	2012
Baseline	t CO2eq/y	6.391	25.563	25.563	25.563	25.563	25.563	25.563	25.563
Project	t CO2eq/y	4.576	18.020	17.163	17.163	17.163	17.163	17.163	17.163
Total tonnes CO2eq	**t CO2eq/y**	**1.814**	**7.543**	**8.400**	**8.400**	**8.400**	**8.400**	**8.400**	**8.400**
									59.755

As far as the hot water transmission network was not constructed in 2005 the effect of the project within 2005 is due to the boiler efficiency improvement only. The effect of the other measures (ECO2) will be achieved after October 2006 when the installation of hot water network is done.

2 Zebra AD JSC

The main goal of the project of Zebra JSC is improvement of the energy efficiency at the rubber products production plant, through the implementation of three groups of energy savings measures.

Planned activities
Three groups of energy conservation opportunities (ECO) for the energy efficiency project are proposed and partly implemented:

i. ECO 1 - Implementation of combined steam/power production, based on gas engine 1570GQMB , with utilization boiler, water treatment, de-aeration devices and steam pipeline replacement and installation of an electric generator;
ii. ECO 2 - Utilization of waste heat for process and heating purposes;
iii. ECO 3 – Replacement of the Calendar engine.

The project envisages installation of a cogeneration module type 1570GQMB, manufactured by Cummins Power Generation Ltd. The CHP module is based on a gas engine and electric generator type QSV81G with 1,566 kW nominal electric output. The cogeneration installation will cover up to 2.9 t/h of the steam consumption of the plant through utilisation of 936 kW exhaust flue gases in a steam generator with capacity of 3.5 t/h, and steam pressure of 13 bar, manufactured by Kotlostroene Jsc and up to 989 kW of heat by heat exchangers in the engine HT and LT water circuits for make-up water heating from 20 to 90 degrees.

A new, high efficient water treatment installation is proposed. The new equipment will replace the existing non-efficient water treatment installation and will improve the quality of the feed water for steam generation.

The project envisages installation of an aggregate station for blow down heat utilisation from the steam boiler. Installation of four aggregate stations: two stations in the 1st detached production division, one station in the 2nd detached production division and one station in the 3rd detached production division are proposed. Replacement of the existing Calander engine by an electric motor Siemens type 14BG 318- 4AA60-Z with frequency inverter Micromaster, type 6SE6430-2UD42-5GA0 is also proposed.

The total balance of CO_{2eq} emissions over the period 2005-2012 is given in the table below.

Scenario	Unit	2006	2007	2008	2009	2010	2011	2012
Baseline	t CO2eq/y	6.994	27.974	27.974	27.974	27.974	27.974	27.974
Project	t CO2eq/y	4.929	19.625	19.625	19.625	19.625	19.625	19.625
Total tonnes CO2eq	**t CO2eq/y**	**2.064**	**8.349**	**8.349**	**8.349**	**8.349**	**8.349**	**8.349**
								52.157

3 Pirinplast

The project of Pirinplast Jsc envisages the replacement of 5 low efficient injection machines with new highly efficient injection moulding machines, characterized by a high productivity and low energy consumption. Improvement of both productivity and quality of the manufactured products as well as higher efficiency will be achieved. In addition to energy consumption the maintenance costs will reduce as a result of the new injection moulding machines. The project implementation will contribute to a decrease in annual electricity consumption in the amount of 1,773 MWh.

The total balance of CO_{2eq} emissions over the period 2005-2012 is given in the table below.

EMISSION REDUCTIONS:									
Scenario	**Unit**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Baseline	t CO2eq/y	1.544	2.646	2.646	2.646	2.646	2.646	2.646	2.646
Project	t CO2eq/y	183	314	314	314	314	314	314	314
Total tonnes CO2eq	**t CO2eq/y**	**1.360**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**
									17.686

A.3. Project participants:

Host country:
Bulgaria

All projects are financed by the EBRD Bulgaria Energy Efficiency and Renewable Energy Credit Line Support Facility (BEERECL)[1]. The facility is a credit line for small and medium sized projects in the field of renewable energy and energy efficiency, established by the EBRD. UBB is one of the banks in Bulgaria that operates this facility. In the past companies in Bulgaria could not borrow on the capital market for these kinds of projects. With BEERECL, UBB is able to provide their clients a credit for investments of this kind. UBB also grants a grace period for each loan. The role of UBB is one of a lender and intermediary. UBB will obtain the credits from the individual project operators, and will be the contracting party for selling the credits to the EBRD Carbon Fund (established by the Dutch Government). From this responsibility, it will also

[1] For more information refer to "www.beerecl.com"

take a leading role in making agreements with the individual project operators on registration and monitoring of emissions reductions and other relevant data.

Projects' Sponsors:

United Bulgarian Bank
5 Sveta Sofia Street, 1040 Sofia, Bulgaria
Contact persons:
Mrs. Hrisimira Malcheva
E-mail: malcheva_h@ubb.bg
Tel. +359 2 811 2229
Mr. Stefan Vassilev
E-mail: vassilev_st@ubb.bg
Tel. +359 2 811 2594

Sugar Plants JSC
Sveti Knijaz Boris 1 Str. R29, Gorna Oryahovica, Bulgaria
Tel. +359 618 414 61
Fax.+359 618 417 09
e-mail: office@zaharnizavodi.com
Mr. Georgi Alexiev Yzynov

Zebra AD
1280 Novi Iskar, Sofia, Bulgaria
Tel. +359 2 936 06 54
Fax. +359 2 936 08 93
e-mail: zebra@mail.orbitel.bg
www.zebra-bg.com
Mrs. Slavka Stefcheva

Pirinplast AD
2900, Goce Delchev, Bulgaria
Tel. +359 751 69022
Fax. +359 751 60617
e-mail: pirinplast@goce.net
Mr. Stojan Vakareev

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

Bulgaria

A.4.1.2. Region/State/Province etc.:

Sugar Plants is located in the Veliko Tarnowo region.
Zebra project is located in the Sofia region.
Pirinplast is located in Blagoevgrad region.

A.4.1.3. City/Town/Community etc:

Sugar Plants are located in Gorno Oriahovitsa (Number 1 on map below).

Zebra is located in Novi Iskar (Number 2 on map below).
Pirinplast is located in Goce Delchev (Number 3 on map below).

Figure 1: Map of Bulgaria with project locations

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

1 Sugar Plants

The Sugar plant is situated in the industrial area of the town Gorna Oryahovica, about 4 km from the city along the road to Dolna Oriahovica. On the Sugar plant site the autoproducer thermal power plant is located, next to the railway for coal supply.

2 Zebra

Zebra is located just outside the village of Novi Iskar, in an industrial area. The plant itself is located at both sides of the main road, connecting the village with the industrial area.

The company is a leader in production of V-belts, rubber sheets and floorings, super-elastic and press-on solid tires, rubber compounds, rubberized rollers, filtering gas masks and protective clothing, wide range of moulded all rubber and rubber-metal goods. Zebra produces more than 2,800 tons of products per year. About 90% of the output is exported.

The basic groups of the company products are manufactured in three separate production divisions:

- 1st detached production division (V-VI workshops) - special production, gas masks, rubber-coated fabrics, floor coverings, rubberized production
- 2nd detached production division (II-IV workshops) - rubberized belts and composites
- 3rd detached production division (I-III workshops) - rubberized metal production, caoutchouc mixture.

3 Pirinplast

The Pirinplast factory is located in the small town Goce Delchev. The town is allocated in the South-West part of the country in about 25 km from the border with Greece. The site is allocated in the industrial part of the town at the road to Greece in about 3 km from the center of the town.

Project boundaries are formed by (i) 20kW electricity supply substation, where the total electricity demand of the company Pirinplast is measured by an electric meter owned and controlled by the regional electricity distribution company (ii) input doors of the storage for production. The production volume is measured and calculated at the input of the storage.

A.4.2. Category(ies) of project activity:

The methodology addresses the energy efficiency and fuel switch.

A.4.3. Technology to be employed by the project activity:

1 Sugar Plants

Two groups of technical measures for the energy efficiency improvement are proposed:

- ECO 1 Reconstruction of steam boiler PK–35-39 No. 3
- ECO 2 Installation of two heat exchangers.

ECO 1 Reconstruction of Steam Boiler PK–35-39 No.3

A set of measures for the improvement of the technical and operational condition of the steam boiler PK-35-39 No. 3 is proposed aiming to increase its energy efficiency. The reconstruction of steam boiler PK-35-39 No.3 in TPP Sugar Plants – Gorna Oriahovitsa has to fulfil the following objective :

- Achieve a higher efficiency, which is expressed in decreasing the thermal losses of the boiler and - most of all - the thermal losses with flue gasses and the losses from mechanical un-oxidation of fuel;
- Expand the load range of the steam boiler without using additional fuel, whereby its efficiency is guaranteed at a decreased load down to 40% from full capacity while maintaining the nominal parameters of the produced steam.

Sugar Plants management is planning that the steam boiler will work approximately 2,820 hours per year after the reconstruction, to cover of minimum steam production loads during the operation of the sugar plant. The efficiency improvement is achieved through the improvement of the combustion process, optimisation of the work of the pulverizing systems and repair of the steam boiler, to minimise the leakages (reducing the inflow of unnecessary cold air) and leading to normal operating conditions. As a result of the change in fuel from brown coal to black gas coal, it is required to increase the temperature of the hot air in the pulverizing systems in order to achieve the necessary quality of the coal dust. This guarantees high performance of the combustion process. The increase of this temperature would be realized through layout change of the heating surfaces in the convective shaft.

To fully benefit from the optimisation of the combustion process, the boiler requires a change in the fuel combustion systems and a new connection with the pulverizing systems. Beside the two basic objects of reconstruction - convective shaft (economiser, air heater) and combustion systems- the following components need to be reconstructed too: part of the air ducts, gas ducts, steam valves, natural gas/heavy fuel burners, thermal insulation of the boiler, replacement of the brickwork, sheathing, screen system in the furnace chamber, drum, elements of the electrical part of the boiler, controls and others.

ECO 2 Construction of Two Heat Exchangers

The installation of two heat exchangers for preparation of hot water for heating and potable hot water supply is suggested. The efficient operation of one of the two backpressure turbines PR 6-35/5/12 (TG2)_ for combined production of thermal and electric energy requires certain thermal loads by the backpressure parts of 0.6 MPa and 0.12 MPa of the turbine.

Existing low pressure (0.12 MPa) steam load at the Sugar Plans facilities does not allow the co-generation backpressure turbine TG2 to run efficiently. The low-pressure load lack impedes the economical production of electric energy, because it requires releasing the unused steam 0.12 MPa in the atmosphere. That is why the TG2 in not in operation now. The rational utilization of the co-generation cycle can be provided through the construction of two heat exchangers, which utilize steam of 0.12 MPa for the production of hot water for heating and potable hot water supply for the Sugar plant and other consumers that are supplied with steam now. In addition, the hot water heat transmission system leads to the decrease of thermal losses in the environment due to replacement of steam as a thermal carrier. Also, the proposed improvement will provide the condensate reflow, which leads to direct reduction of the fuel consumption for water heating, as well as less needs for chemically purified water. As a result of the co-generation cycle improvement the electricity production increases from the same steam input to the turbine and becomes very economically attractive for the Sugar Plants. Therefore, the quantity of the electrical energy, purchased from the electricity distribution company will be decreased. This will lead to direct money savings for the Sugar Plant.

2 Zebra JSC

The main goal of this project is to achieve better energy efficiency within Zebra. This is achieved through the implementation of the following four groups of proposed technical measures:

- Combined steam production and electricity generation;
- Waste heat utilisation for technological needs and heating;
- Replacement of Calander engine with frequency controlled electric motor.

Combined steam/power production

The project provides for the installation of a cogeneration module type 1570GQMB, manufactured by Cummins Power Generation Ltd and an electric generator. The CHP module is based on a gas engine and the generator is type QSV81G with 1,566 kWe nominal electric output. The cogeneration installation will cover up to 2.9 t/h of the steam consumption of the plant through utilisation of 936 kW exhaust flue gases in a steam generator with capacity of 3.5 t/h and steam pressure of 13 bar, and up to 989 kW of heat by heat exchangers heating water from 20 to 90 degrees. The cogeneration module has an electrical efficiency of 38.7 %.

The cogeneration module works in parallel with the supply electric grid 400 V/50 Hz. The control and energy measurements are operated through technical devices, manufactured by Power Measurements Ltd.
The annual electricity production will be 9,470 MWh and the annual consumption of natural gas will increase by 1,537,000 Nm^3.

In combination with a high efficient water treatment installation, a new thermal deaerator and an aggregate station for blow down heat utilisation, the annual electricity consumption will be reduced with 28 MWh and the annual consumption of natural gas will be reduced with 147,000 Nm^3.

Waste heat utilisation for technological needs and heating

The heating system will be modified from centralized to local heat production, where reduction of the steam pressure is performed in the local area substation. The project envisages installation of four aggregate stations: two stations in the 1st production site, one station in the 2nd production site and one station in the 3rd production site. The station will be equipped with efficient heat exchangers, recirculation pumps, expanders, regulators type BPRV, PRV and TVS, safety and control valves and measurements devices.

Outside the production area, the change of the energy carrier in the heating installation from low pressure steam to water leads to a more efficient utilisation of the secondary steam for heating purposes. In the summer, the pressure in the extension vessels will be maintained by injection of soft water together with the condensate.

The implementation of the suggested measure will lead to reduced steam demand and reduced natural gas consumption. As a result of this measure, the annual consumption of natural gas will decrease by 133,000 Nm^3.

Replacement of Calander engine with frequency controlled engine

Replacement of the Calander engine (motor-generator group including 320 kW asynchronous motor, direct current motor, internal ignition natural gas motor and speed reducer) by an electric motor type Siemens 14BG 318- 4AA60-Z with a frequency inverter, type Micromaster 6SE6430-2UD42-5GA0 is proposed. The new electric motor works at 400VD/690VY 430 A; 50 Hz. The frequency inverter will operate with input 3x380-480V ± 10% and output 3x0-480V; 477A and will be delivered with a base control panel. The equipment is working 2,600 hours annually, mostly within peak and day tariff zones.

The result of this measure will be a decrease of the annual consumption of electricity by 190 MWh.

3 Pirinplast

The purpose of this project is to increase: the energy efficiency through the replacement of five injection machines in the production cycle; and the productivity as well as the efficiency of the production process. The ECO measures include the replacement of the old injection machines with new, high-tech ones with a minimal consumption of electricity.

The installed capacities and the calculated annual electricity consumption of the injection equipment are shown hereunder:

New Process equipment	Installed capacity [kW]	Coefficient of usage	Rated power	Working hours	Electricity consumption
Injection moulding machine	26	0.60	16	1,470	22,932
Injection moulding machine	35	0.65	23	1,470	33,443
Injection moulding machine	35	0.65	23	1,470	33,443
Injection moulding machine	169	0.60	101	1,470	149,058
Total	**265**		**163**		**238,875**

According to the prospect data of the manufacturer factory, the total installed capacity of the four new injection moulding machines is 265 kW, at maximal load.
The contracted Krauss-Maffei machines have an energy-saving hydraulic-mechanical system. It has a precise regulation of pressure, oil volume and speed, that meet precisely the requirements. This leads to a large reduction of the energy use. The temperature regulation of the plastification cylinder heaters represents a proportional-integral-differential (PID) regulation. In this case, the difference between the set and real temperature is between 1ºC and 2ºC. This leads to economy of electricity and prolongs the heaters life. The heaters insulation is very good, which also decreases heat losses.

The machines are offered with a full guarantee for a period of three years. The new equipment will be serviced by two workers. The improved technical parameters of the new machines allow the increase of productivity even in the frames of a one-shift regime of work. These machines will minimise the delays, because of repair, and deliver more products of a higher quality in the same time.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed JI project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

Baseline Scenario

1 Sugar Plants
The Sugar Plant produces mainly crystal sugar in different packages: bags of 50 kg, paper bags of 1 kg, PVC bags of 5 kg, cubes in boxes of 1 kg and 0.5 kg.

Sugar Plant Production Daily Capacity:

Products	Capacity
Sugar from sugar-beet	3,400 t/beet per 24 hours
Sugar from sugar-cane	800 t/raw sugar in 24 hoours

The Technical Ethanol Plant produces ethanol for technical purposes (about 5 % of the whole production) from main raw materials – molasses and others (supplied from Razgrad). Produces also CO_2. Production capacity – 80,000 l/24 h and 3,600 t CO_2.

Sugar Plant Production Capacity per Shift:

Products	Capacity per shift [kg]
Caramel	6,000
Lakta	1,640

Chwing	1,000
Jelly	2,300
Waffles	6,500
Turkish delight	3,500
Halva	3,500

The Packaging Plant produces all types of cardboard packages, paper packages, polypropylene, and aluminium foil, cellophane. The printing process is by offset printing, deep copper print and stamping. The Reconstructions and Mechanical Factory produces equipment and metal constructions, spare parts, ferrous and non-ferrous metal moulds. Since the capacity is not fully used, the workers are directed to the reconstruction activities in the other units.

The Thermal Power Plant produces steam and energy for the whole plant (all factories) needs, ensures the district heating of 200 households and heating of the Professional Food and Beverages College, etc.

Energy production (2003):

	Generation
Annual energy generation:	
Thermal energy	47,688 t
Electricity	15,416 MWh
Capacity:	
Thermal energy	180 t/h
Electricity	12 MW

In 2003 the Sugar Plants TPP produced 15,416 MWh of electricity for industrial and household needs. The company purchases electricity from Elektrorazpredelenie – Gorna Oriahovitsa JSC In 2003 the company purchased 7,295 MWh of electricity. The TPP sold 3,222 MWh of electricity to the grid in 2003. The company's electricity consumption totalled 19,489 MWh.

The Sugar Plants buy coal from Russia. The annual coal consumption equals 28,391 tonnes. Sugar Plants uses heavy fuel oil, supplied by the petroleum bases of LUKOIL JSC. The TPP's annual consumption of heavy fuel oil is 922 tonnes. The consumption of coal at the Sugar Plants TPP accounted for 84.7% of the company's overall consumption of energy resources.

The Sugar Plant's Thermal Power Plant (TPP) has three coal fired boilers and one heavy oil fired boiler. The coal fired boiler PK-35-39 No. 3 is currently operating. It is designed for burning coal at hard separation of ash from the cool cone of the furnace chamber. It burns brown coal with calorific value, Qr i of 3,400 kkal/kg, moisture content Wr of 12 %, and ash content of the processed mass Ar of 36%. However, currently it operates using anthracite coal with calorific value Qr i = 5,100 ¸ 5,900 kkal/kg. It uses some heavy oil for starting up.

The study of the boiler's regime of operation has shown that its technical capacities are highly limited because of undue admission of unorganized air into the furnace chamber and the convective shaft and deteriorated operation of the powdering plants. At the same time, the boiler is not equipped with the control and measuring devices and automation, needed for automatic maintenance and control of the optimal regimes of operation within this capacity range. This results in reduction of the boiler's efficiency caused mostly by higher losses due to insufficient mechanical incineration and losses from the flue gases.

The following table presents baseline situation:

BASELINE:		
Emissions Characteristics	**Unit**	**Amounts per year**
Electricity Consumption	MWh/y	19.489
Heavy oil consumption	t/y	199
Coal consumption	t/y	8.047

The data are based on annual measurements.

2 Zebra

Zebra is a Bulgarian company, founded in 1929. Already 75 years the company is a leader in production of V-belts, rubber sheets and floorings, super-elastic and press-on solid tires, rubber compounds, rubberized rollers, filtering gas masks and protective clothing, wide range of moulded all rubber and rubber-metal goods. Zebra produces more than 2,800 tons of products per year. About 90% of the output is exported.

Zebra uses electric energy for production operations in the separate workshops. The annual electricity consumption baseline in the enterprise will be 8,444 MWh (average 2000-2004). The plant uses natural gas for steam production at the boiler station. The annual natural gas consumption baseline in Zebra is 2,937,000 Nm^3 for steam generation.

Zebra is a large consumer of energy carriers. The high electric energy and natural gas consumption and costs in the plant are due to the old or inefficient process equipment and systems as follows:

- Inefficient summer steam production;
- Lack of de-aeration installation at the boiler station;
- Inefficient water treatment system at the boiler station;
- Centralized heating system;
- Inefficient process equipment.

The table below presents the main parameters of the large existing process equipment in the enterprise:

No	Existing process equipment	Installed capacity [kW/unit]	Number of units	Total installed capacity [kW]
1	Rubber mixer	640	3	1,920
2	Calendar line	340	2	680
3	Three-shaft unit	630	1	630
4	Impregnation	563	1	563
5	Shaft unit 6	160	3	480
6	Three-shaft unit	453	1	453
7	Shaft unit 1500	133	3	399
8	Two-shaft unit	233	1	233
9	Chopper machine	202	1	202
10	Shaft unit 10	171	1	171
11	Strainer	160	1	160
12	Lights	0.4 & 0.04	2,407	155
13	Compressor	145	1	145
14	Cooling installation	143	1	143
15	Mixer-shaft unit	140	1	140
16	Rubber mixer	132	1	132

17	Dynamometric stand	125	1	125
18	Crecker shaft	110	1	110

In the factory a boiler station is situated, which generates steam for process needs, heating and hot water. The process steam in the plant is generated by one boiler type EKM 12 with capacity of 12 t/h saturated steam at pressure 11 bar and one boiler type KM 12 also with 12 t/h capacity, both equipped with combined natural gas/residual fuel burners RAY type BGEC 1,000 and BGEC 800. The steam demand in the plant at pressure 11 bar is 1.5 – 2 times lower in the heating season - the steam consumption varies within 6 to 7 t/h during day time and within 4 to 6 t/h in the night shifts. In the summer the steam consumption is even lower and the average hourly steam production is 3 – 4.5 t/h. This data shows that the equipment is working at 30 % of its capacity in annual aspect. The exploitation parameters in these regimes are very unfavourable for the equipment energy efficiency. The average annual efficiency of the boilers is 75-80 %. The average age of the equipment exceeds 20 years.

Currently in the boiler station there is no de-aeration installation, this leads to inefficient steam production (at lower temperature) and increased corrosion of the heating surfaces in the boilers. The de-aerator separates the oxygen and other aggressive gasses from the boiler feeding water. It fails to operate anymore.

The water treatment system is scaled down to absorption of only Ca and CO_3 ions. The non-efficient operation of the water softening installation leads to accumulation on the heating surfaces of the boilers. On the other hand this leaves many corrosive ingredients in the water, resulting in more frequent repairs of the inside boiler heating surface, which increases exponentially over time. All this leads to high energy losses.

The steam distribution substations in the plant have very little potential to utilise the secondary evaporated steam from the condensate, which has high thermal potential. The secondary evaporation of the condensate at 1 bar is about 20% of the evaporation at 10 bar. This is about 12-15% of the enthalpy of the condensate. The processes requiring steam have various pressure requirements: 10 - 11 bar, 6 - 7 bar and 2- 2.2 bar (the last is for heating purposes and some material preparation processes). The heating of the enterprise is centralized, using saturated steam at 1.5 - 2 bar, reduced from steam at 10 - 11 bar in the plants central heating substation.

The hot water boilers have a too large capacity, calculated on the basis of twice the current number of employees. Each of the workshops (total 5) has own boiler for hot water of the above type with capacity of $2.5m^3$ – $5m^3$, electrically powered or using steam. All of them lack insulation and temperature regulation.

The Calender engine contains an engine-generator group including asynchronous engine with nominal capacity of 320 kW. The equipment is old and inefficient and is lacking the necessary control devices all this leading to inefficient energy use and high energy losses.

The high energy carriers cost, respectively the high cost of the produced products and the increased competition in rubber products availability are the reasons why Zebra seeks opportunities for improvement of the energy efficiency.

Baseline data with emission calculations in the baseline scenario:

BASELINE SCENARIO:		
Emissions Characteristics	**Unit**	
Steam production	t/y	30.551
Electricity purchased from NEC	MWh/y	8.444
Natural Gas Consumption	1000 m3/y	2.937
Natural Gas Consumption	GJ/y	98.390

The calculations for the baseline have been based on the averages of the measurements from the three years 2002, 2003 and 2004

3 Pirinplast

The workshop manufactures plastic details for the household and technical details through pressure die-casting and through blasting. Injection and blasting automated machines are used for this purpose.

The technological process of pressure die casting is carried out in the following succession: The granulated plastic is fed from a tank into the plastification cylinder of the injection machine, where it is melted at high temperature. The melted plastic is fed under high pressure into a mould by means of a piston. After that, the ready product is taken from the mould and the cycle is repeated.

The technological process of blast casting is as follows:
The granulated plastic is fed from a tank into the plastification cylinder of the blast machine, where it is melted and is fed in the cylinder. By means of a piston, the material is pushed from the cylinder through the machine head and a cast in the form of a cylinder of a specific length is obtained. This cylinder is closed into a blast form and it is blown with air until a product of specific form is received.

The table hereunder shows the injection machines and blasting automatic devices, which are installed in the Injection Workshop:

No.	Type of machine	Units	Installed capacity [kW]	Year of manufacturing
1	SK 4000/3100	1	114	1998
2	SK 2500/2000	1	72	1995
3	SK 1600/810	1	47	1995
4	SK 1000/500	1	32	1996
5	NB 130/525	2	38	1990
6	NB 90/290	3	32	1990
7	NB 200/590	1	68	1978
8	NB V 17-110	1	32	1977
9	НБ V 12-80	2	22	1978
10	Triluci 279/80	2	22	1977
11	Plastic-metal 160/240	1	26	1976
12	FO 200/80	3	23	1981
13	TOS 1025/320	3	90	1983
14	Quasi 1000/4000	3	180	1973
15	Quasi 1000/4000	1	180	1985
16	Quasi 5000/630	2	160	1975

17	Quasi 800/250	2	48	1975
18	Quasi 400/160	1	34	1974
19	Quasi 170/55	1	18	1987
20	Quasi 9000/1250	1	175	1988
21	BA 60	3	150	1986
22	BA 10	1	40	1973
23	BA 1-3	1	22	1988

The following machines from the presented in the presented table have not been used since four years: NB 200/590 -1 pcs, NB V 12-80-2 pcs, Triulci 270/80 - 2 pcs., Plastic-metal 160/240-1 pcs, FO 200/80-3 pcs, TOS 1025/320-3 pcs, Quasy 1000/4000-3 pcs.

The above machines are not operational, due to their extremely bad energy indicators, i.e. extensive energy consumption.

The remaining machines manufacture about 130 products for the household, as well as technical products: buckets, wash basins, toilette seats, plant pots – about 40 kinds, cases for the transportation of bread, beer, fruits and vegetables, disposable cutlery; breaker brackets, dangerous wastes containers, bag holders and fasteners, etc. These products vary in weights, which necessitates the use of different machines for their manufacture.

There are injection machines with a pushing force of between 55 and 1,250 tonnes (from 80 to 4,000g material). The process has a number of shortcomings, which delay manufacture and make it more expensive.

The high number of machines' work hours calls for the more frequent repairs. Finding of spare parts for them is difficult, even impossible. All this leads to spending material, time, energy, hydraulic oil, labour and production costs increase. Therefore, the replacement of part of the process equipment in the workshop with new ones, which operate at quicker cycles, is planned.

The total number of machines, offered for replacement, is five, which represents 15 per cent of the total number or 29% of the injection machines currently in operation. The data about these machines are shown hereunder:

No.	Existing injection machines, type	Installed capacity [kW]	Year of manufacturing
1	Quasy 400/160	34	1974
2	Quasy 800/250-1	48	1975
3	Quasy 800/250-2	48	1975
4	Quasy 5000/630-1	160	1978
5	Quasy 5000/630-2	160	1978

The regulation of the heating of the plastification cylinders of these machines is a proportional and two-position one. In this kind of regulation, the real temperature fluctuates about 10 per cent of the specified temperature. The heaters insulation is not good and a great part of the heat is lost. All this leads to increased costs for energy.

Electricity consumption:

BASELINE SCENARIO:		
Emissions Characteristics	**Unit**	
Production data		
Corrugated materials from PP	#/y	10.669
Total number of products	#/y	12.765
Average	#/y	11.717
Electricity purchased from NEC	MWh/y	2.006

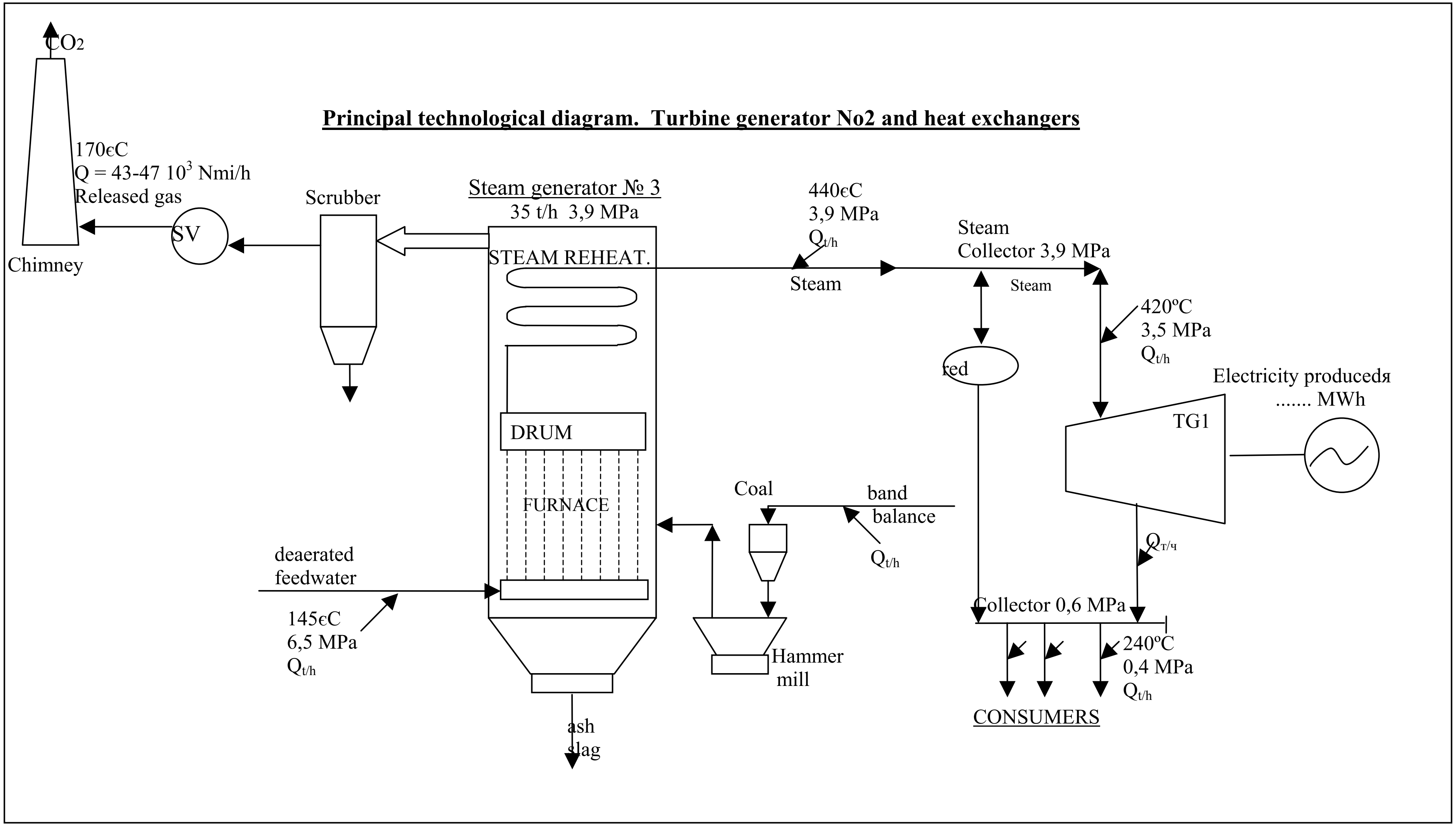
Project Scenario and determination of why the emissions in the baseline scenario would likely exceed emissions in the project scenario:

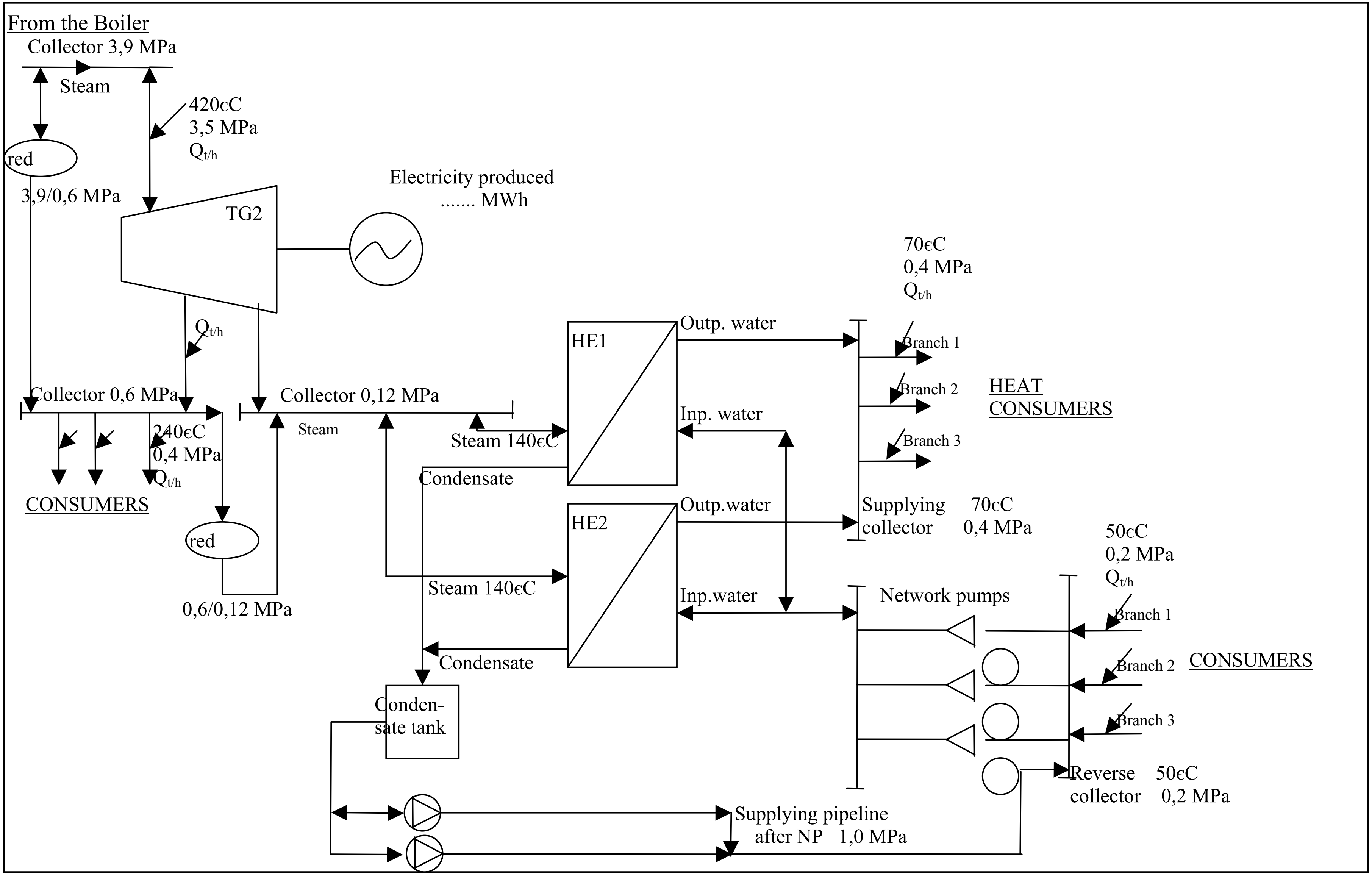
1 Sugar Plants

The energy efficiency project will improve the quality of the Sugar Plants produce. The reconstruction of boiler PK- 35-39 N3 will result in high efficient production of superheated steam with permanent parameters, guaranteeing the quality of the heat-transfer medium released through the steam ducts of the turbines for technological needs. The net cost of the produce will go down 4.8% as a result of the reduction of energy costs that, on its part, will enhance the competitiveness of the goods.

The new steam heat exchangers will improve the quality of heating, supplied by Sugar Plants. The losses from hot water transmission are lower than those of steam transmission and the reflow of water will reduce losses that comes from the lack of condensate reflow. The transfer of steam heating, characterized with high temperature of surfaces, to water heating, will exert a favourable influence on the improvement of the working hygiene in the separate plants of the company. The implementation of the project will reduce annual costs on overhaul and maintenance at Sugar Plants TPP by 21.5%. The project will also benefit the environment, as release of “excessive” steam in the air will be terminated. The efficiency of cogeneration at the power plant will be improved, as more electricity will be produced from the same quantity of steam.

Principal technological diagram – boiler No 3 and turbine generator No1.




From the Boiler
Collector 3,9 MPa
Steam
420єC
3,5 MPa
Qt/h
red
3,9/0,6 MPa
TG2
Electricity produced
.... MWh
Qt/h
Collector 0,6 MPa
Collector 0,12 MPa
Steam
240єC
0,4 MPa
Qt/h
CONSUMERS
red
0,6/0,12 MPa
Steam 140єC
Condensate
HE1
Outp. water
Inp. water
70єC
0,4 MPa
Qt/h
Branch 1
Branch 2
Branch 3
HEAT
CONSUMERS
HE2
Outp.water
Supplying collector
70єC
0,4 MPa
Steam 140єC
Inp.water
Network pumps
50єC
0,2 MPa
Qt/h
Branch 1
Branch 2
Branch 3
CONSUMERS
Condensate
Conden-
sate tank
Reverse collector
50єC
0,2 MPa
Supplying pipeline
after NP 1,0 MPa

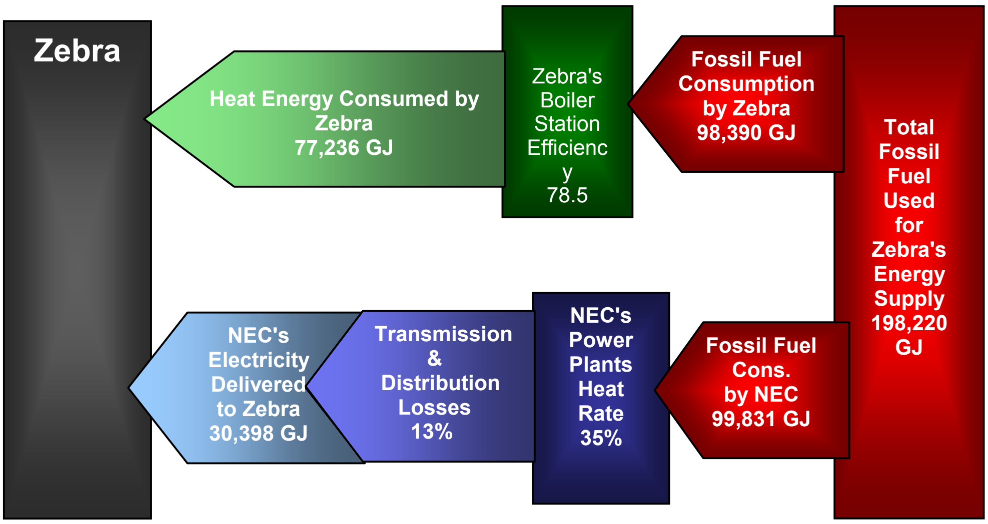
2 Zebra

The energy efficiency improvement is achieved through the implementation of the following four groups of technical measures:

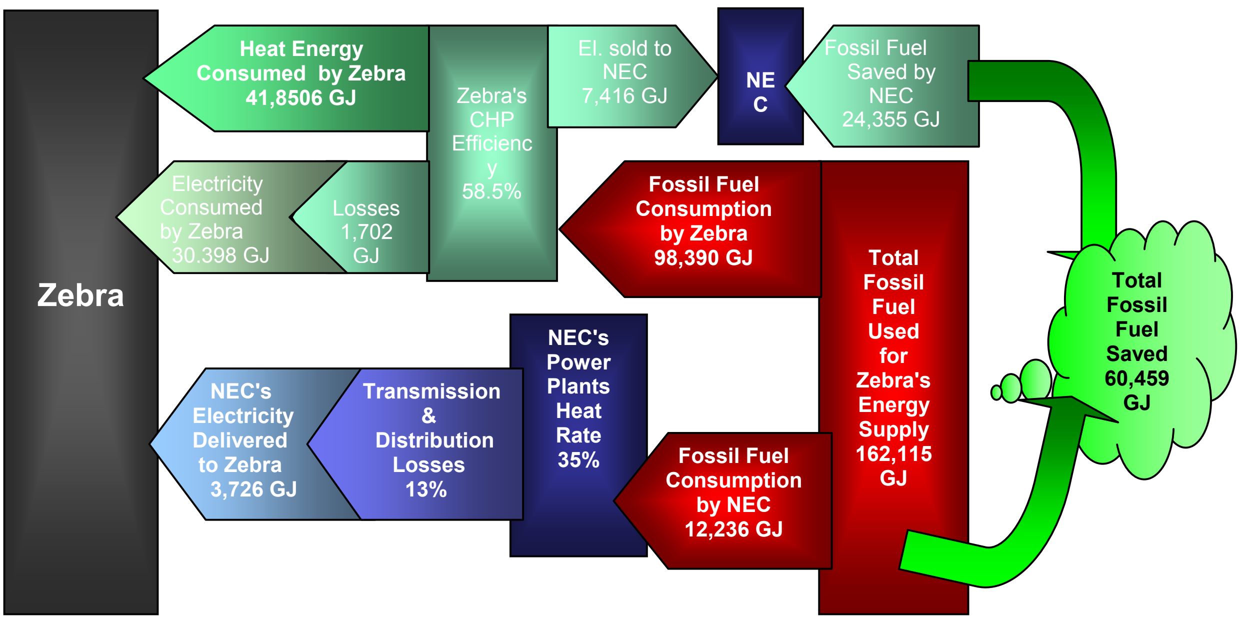
- Combined steam production and electricity generation
- Waste heat utilisation for technological needs and heating
- Replacement of Calander engine with frequency controlled electric motor.

Comparison of the total fossil fuel consumed for electricity and heat supply of Zebra before and after project implementation of ECO 1:

BASELINE



PROJECT CASE:



In addition to this and as a result of the construction of high efficient water treatment installation, new thermal de-aerator and an aggregate station for blow down heat utilisation, the annual electricity consumption will be reduced with 28 MWh and the annual consumption of natural gas will be reduced with 147,000 Nm^3.

The Calander engine will be replaced by a new electric motor and a base control panel. The equipment is working 2,600 hours annually, mostly within peak and day tariff zones. The result of this measure will be a decrease of the annual consumption of electricity by 190 MWh.

3 Pirinplast

As a result of replacement of the existing 5 high energy-consuming injection machines at the Injection Workshop with 4 new automatic injection moulding machines of lower electricity consumption and higher efficiency, the annual consumption of electricity will decrease by 1,773 MWh compared to the baseline consumption of electricity.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

Total amount of CO_{2eq} emission reductions in tonnes amounts to 233,602 over the years 2005-2012, of which 68,394 tons during 2005 - 2007.

SECTION B. Application of a baseline methodology

B.1. Title and reference of the approved baseline methodology applied to the project activity:

The project uses the approved baseline methodology AMS-II.D. “Energy efficiency and fuel switching measures for industrial facilities”.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM (JI) project activities, a simplified baseline methodology is used.

The energy savings of each project do not exceed the equivalent of 15 GWh per year.

The energy baseline consists of the energy use of:

- the existing equipment that is replaced in the case of retrofit measures; and,
- the facility that would otherwise be built in.

The electricity component of the energy baseline is adjusted for technical transmission and distribution losses for the electrical grid serving the industrial facility.

B.2. Description of how the methodology is applied in the context of the project activity:

A. *The chosen methodology is designed for project activities aimed primarily at energy efficiency and that involves primarily fuel switching.*[2]

The project includes energy efficiency measures:

- in the Sugar Plants: by the reconstruction and improvement of energy efficiency of an existing boiler used for steam and electricity production, and the establishment of 2 heat exchangers for heating energy and hot water, where the waste heat of the steam turbine is used, that would otherwise have been released to air
- in Zebra AD: by implementation of combined steam/power production, based on gas turbine, de-aeration devices and steam pipeline replacement, replacement of an engine with frequency controlled engine, and utilization of waste heat for technological and heating purposes
- in Pirinplast: by the replacement of 5 low efficient injection machines with 4 new highly efficient injection moulding machines with high productivity and low energy consumption.

There are measures for replacement of the existing equipment (i.e. in the Sugar Plants project, reconstruction of some parts of the whole installation) and for installation of new facilities.

---

[2] Fuel switching measures that are part of a package of energy efficiency measures at a location are part of a project activity included in this project category.

B. *The baselines of the three proposed projects have been defined*

The figures mentioned in this text are marked orange in the attached spreadsheet (Annex 4).

ECO 1 in the **Sugar Plants**: the baseline is based on the ratio between steam production in the old boiler that would not be reconstructed without the JI project and the amount of coal, heavy fuel oil and electricity to produce it (per ton steam). The boiler operates in the range of loads between 60% and 100% with average loading (2003 data) that vary from month to month from 70% to 82%.

For this company the baseline is calculated based on steam output and fuel input. In the baseline situation the boiler PK-35-39 is fuelled by coal and heavy fuel oil (HFO) for starting up. The produced steam is delivered to generators, to produce electricity. The oil burners, to start up the boiler, will be fuelled by gas in order to increase its efficiency (ECO1). The steam production will remain the same. Gas will replace heavy fuel oil consumption completely. For the baseline calculation the amount of steam produced by the boiler will determine the baseline coal consumption, by using the percentage of ton coal consumption per ton steam of 16.87% and percentage of ton HFO consumption per ton of steam of 0.42%. The turbine TG1 will be replaced by a new turbine TG2, generating electricity more efficiently. The steam production remains the same, so more electricity is self produced, leading to less electricity consumption from the grid. To calculate the baseline regarding electricity from the grid the additional generated electricity must be calculated and multiplied by the respective emission factor of the grid. The amount of steam produced will be multiplied by 0.37 to calculate the total own production.

ECO2, the two heat exchangers decrease the amount of coal, that would otherwise have been used to produce enough steam. The baseline is the saved amount of coal multiplied by the baseline ratio of coal per ton steam and the respective emission factor of coal. The efficiency gain of the heat exchangers will lead to ca. 5.84% less coal use in the steam generator in comparison to the baseline situation.

In order to calculate the baseline for **Pirinplast**, the relation between product output and electricity consumption of the moulding machines needs to be set. Given the number of data for only 3 years, a best estimate is made using the relative deviation of the “produced products” and “electricity consumed” ratio. Having used this method, the best estimate is to use the average of “Total Production” and “Corrugated materials from PP” (the main product) divided by 5.84, to estimate the annual electricity consumption. Using this calculation, the calculated electricity consumption in 2002 would be 1636 MWh (measured 1703 MWh), in 2003 1595 MWh (1535 MWh) and in 2004 2005 MWh (2011 MWh). In lower production years the method would lead to some overestimation: in high production years to some underestimation. Since economic growth is Bulgaria is growing, the expectation is that the production of plastic products will also increase. As a result, the used method to calculate the baseline will give conservative results. The baseline is calculated from 2005 onwards, using the production data of 2004.

For **Zebra** three measures are proposed, for which a baseline calculation method is prepared. For ECO1, the baseline is calculated using the gas consumption (in Nm3) per ton steam, used by the boiler. This ratio is 96, meaning that total steam production multiplied by 96 will lead to the gas use in Nm3 . In addition, the baseline for ECO1 for electricity purchased from the grid will be calculated also using the ratio of measured total electricity consumption per ton steam. This ratio is 28% MWh per ton steam per year. The baseline also includes the net electricity produced by the CHP in the project scenario, as this amount need to be taken into account here, as the project emissions only concern the emissions from gas consumption of the CHP. ECO2 (use of waste heat) is not taken into the baseline, since this does not affect baseline emissions. The baseline includes also the operation of the Calendar engine (ECO3). The electricity consumption is adjusted for the working hours, if the working hours of the engine would be different from the assumed total of 2600 working hours per year.

C. *The additionality test for small scale projects has been applied, where the analysis of the barriers to the project have been made*
There were the following barriers identified: investment barriers - regarding economical market development in the host country and financial unattractiveness of energy efficiency projects, prevailing barriers – where political situation has been analysed and situation in the energy sector in a view of common practice in Bulgaria, other barriers – where political and administrative situation in the country has been analysed and where uncertainness of the provided data for the carbon credits calculations has been identified. It has been concluded that the approval and implementation of the project activity as a JI activity will alleviate the financial hurdles and other identified barriers and thus enable the project to be undertaken.

D. *The boundaries of the projects have been identified*
For each project boundaries systems have been defined, where all relevant installations have been listed and their emissions.

E. *Crediting period*
According to JI restrictions, crediting period is 5 years, 2008-2012. The projects will, however, generate credits before 2008, so-called AAUs. These have been taken in the emission reductions calculations and in the total amount of the proposed credits.

F. *Monitoring Plan*
A simplified monitoring methodology has been applied in the three projects in accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM (JI) project activities.

G. *Calculations of the emission factor*
The calculations have been based on historical data. Simple Operational Margin and Build Margin have been calculated. Emission factor for electricity is presented by Combined Margin.
Dispatch Data Analysis could be applied because:

- No dispatch order is available to determine the top 10% of grid system dispatch order

- The grid system dispatch order of operation for each power plant of the system is not available
- The amount of power (MWh) that is dispatched from all plants in the system during each hour that the project activity is operating is not available.

Average OM could not be used because:

- Low cost/must run resources constitute less than 50% of the total grid generation
- Detailed data to apply option c is not available

Simple adjusted OM could not be used because:

- Chronological load data for each hour of the year is not available
- Low cost must run resources in Bulgaria are estimated on 8% of the total generation. We consider this as a too small amount to significantly impact the lambda factor on the margin.

Method a (Simple OM) is applicable because:

- We define low cost must run resources as follows: low cost must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear, and solar generation. As shown in table below, these resources are not expected to constitute more than 50% of the total grid generation between now and 2010.[3]

Furthermore, IPCC factors for fossil fuels have been applied (for natural gas, heavy oils and coal)[4].

H. *Calculations of the emission reductions*

Emission reductions are presented by the difference between project scenario and baseline scenario:

- In case of Sugar Plants it's the difference between usage of electricity from the national grid, natural gas consumption and consumption of heavy oil fuel.
- Zebra emission reductions is calculated on basis of differences in electricity usage from the national grid and natural gas consumption. In both cases usage of natural gas is increased in the project scenario, while usage of electricity from the grid and consumption of fossil fuels is decreased.
- Emission reductions in Pirinplast are related to reduction of electricity consumption from the grid.

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered JI project activity:

Articles 12, 13 of decision 17/CP.7 and article 1(c) of decision 18/CP.9, allow a starting date of CDM projects before their registration. This means that project activities that have already started to operate, can still be considered additional if they meet the additionality criteria.

The emission reductions generated by this project meet the CDM/JI Executive Boards definition of additionality by (i) having taken CDM/JI into account at the

---

[3] Source: Review of Status of Emissions Trading Activities in CG11 Countries, 2002

[4] Country-Specific Net Calorific Values, n the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories

earliest stages of project development, (ii) using technology that would otherwise not be used to meet new capacity needs in Bulgaria (thus the GHG emission reductions would not otherwise have occurred in the business as usual scenario), and (iii) carbon financing was integral in arranging the long-term financing for the project.

According to the Attachment A to Appendix B of the simplified modalities and procedures for CDM/JI small scale project activities evidence to why the proposed project is additional is offered under the following categories of barriers: (a) investment barrier, (b) technological barrier, (c) prevailing practice and (d) other barriers such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

Potential for the CHP in Bulgaria:

The total installed HOB capacity is 435 MWt, which can be considered as the present technical potential for cogeneration. The economic analysis shows that at current energy prices gas-based CHP is not competitive. Only large-scale CHP of output range 10-50 MWe operating in base load are approaching the market price level.

Small units up to 1 MWe can be feasible as additional heat source to conventional boilers supplying heat to existing network.

This results from the distorted energy prices; the natural gas is an expensive fuel in Bulgaria in comparison with the electricity. Hence gas based cogeneration is not able to compete with coal- and lignite-fired non-cogeneration plants. The gap between the CHP production prices and market prices is large and economical incentives are needed. Higher electricity price would improve the market position of CHP.

The sensitivity analysis shows that at the current electricity price in base load for CHP output range 10-50 MWe the gas should be at least 30% cheaper in order to achieve full competitiveness at the final heat consumers (i.e. including heat delivery).

The CHP technical potential in Bulgaria is in the industrial and district heating sectors. Natural gas based cogeneration in industry only for autoproduction can be considered.

In the district heating sector the potential can not be realised due to distorted prices. Hence under present circumstances this potential is under project assessment research, based on the planned price evaluation.

Independent power producers would not be able of existence under existing conditions, but they will be changed in 2 years.

Besides Sofia DH projects for large CHPs the case studies for Bulgaria demonstrates that the new CHP units are connected to the existing DH systems without need to build heat delivery system. In most of the cases these are 500 kWe gas engines as parallel sources to existing boilers. Also a 2 x 4,5 MWe gas engine installation is presented in the case study. However, this project has no typical financing, a substantial part (25 %) of the investment is financed from foreign grant.

The economic potential for CHP in the future will depend on the evolution of the restructuring, removing price distortions, market liberalization and economic performance of the country. In Bulgaria, as mentioned above, the natural gas network is not well developed and realisation of the cogeneration potential is limited by the unilateral gas supply by Gasprom.

Because of the current low efficiency base, Bulgaria has a vast potential to achieve significant energy efficiency (EE) gains in a cost-effective manner. The saving potential is as high as 50% for existing building stock, 40% for district heating and 30% for industry. The industrial sector accounts for more than half of the savings potential. The Government's National Energy Saving Program to 2010 (adopted in 2001) identified a vast potential for energy saving and specified a large number of specific EE programs and measures for the various end-use sectors with combined energy savings amounting to 1.4 million tons of oil equivalent per year (or about 15% of total final energy consumption) and CO_2 emissions reduction of 5.6 million tons per year. The most promising low-cost energy saving projects (with payback time of less than 3 years) were
included in the Government's medium-term National Energy Saving Action Plan (2001-2003), but very few projects have actually been carried out. During 2001-2003, the commercially financed EE investments amounted to US$13 million, which is only 5% of the annual requirements for EE investments included in the National Energy Saving Program to 2010. This discrepancy is a good indicator of the striking size of the EE finance gap in Bulgaria.

(a) Investment barriers

Albeit opportunities for "win-win" projects (bringing environmental benefits and sufficient financial returns) are abundant given the disproportionately large scope for EE improvements, Bulgaria's EE market is still underdeveloped, failing to produce the needed volume of investment capital. Hereunder are described the most serious investment barriers to such projects:

Bulgaria is an economy in transition. For a long time, energy intensive companies could survive due to low effective energy prices. As energy costs were low, management did not pay attention. In addition specific support from the government to increase energy efficiency was lacking. In 2003 the National Energy Savings Programme for the 2004-2007 period was adopted. However, the European Commission concludes in its evaluation (2004) that “energy efficiency in Bulgaria remains extremely low”. The Energy Efficiency Act (2004) lays down the provisions for Energy Efficiency Programs, Energy Efficiency Measures, and the establishment of an Energy Efficiency Fund.

One of the serious barriers to the uptake of commercial EE finence is difficult access to finance. Commercial bank intermediation relative to the size of the Bulgarian economy is low by any standard, partly as a lingering consequence of the collapse of the banking system during the severe economic and financial crisis of 1996-1997. The corporate sector's access to credit is low by international standards and is still below the level reached before the 1996-97 banking crisis. Commercial banks have managed risks by limiting lending volume, demanding high collateralization (200% and higher), charging high interest rates (14%- 18%, despite inflation being contained lately at 4%), focusing on short-term lending (with loan maturities of 1-2 years) and investing in low-risk government securities. Loans depend primarily on collateral and less so on proven cash flows. Weak competition allows banks to keep credit low while maintaining high margins. Instead of turning to bank borrowing, small- and medium-sized enterprises (SMEs) in Bulgaria rely primarily on cash. The loan portfolio of banks is still simple, consisting largely of working capital loans with short maturities and available mostly to well-established firms. The extreme inefficiency of the Bulgarian judicial system makes recovery of debt or seizure of collateral a long-winded process. The perceived high credit risk hurts especially strongly the SMEs, multi-family housing, municipalities, hospitals and other similar energy consumers, which may not have a significant credit history or lack suitable collateral values associated with EE projects. Perception of high risk for EE projects. In Bulgaria, there is a considerable gap between the real and perceived risk by banks with respect to EE projects. Commercial banks are generally not familiar with commercial and technical issues involved in EE projects and perceive the risks and transaction costs of EE projects as too high. Benefits of these projects are often seen as "environmental" and "social" and there is skepticism about their financial profitability. The staff in many financial institutions has no experience in dealing with EE investments whose benefits are largely intangible (operating cost savings), favoring instead the more familiar energy supply projects that yield tangible output and revenue increases. Another barrier to the financing of EE projects is their generally small size relative to energy supply projects with which they often must compete for financing. Because of the proportionally higher transaction costs, a small EE project may be no interest to banks or it must have a higher rate of return for the size of the return to be high enough for the financial institution to outweigh the transaction costs. Clearly, a proven track record of commercially profitable EE projects is required to convince lenders that a number of risks are only perceived and can be managed, and that the initial costs of getting into this specialized business are worth incurring or can be partially avoided due to prior experience.

Weak capacity to develop bankable EE projects. The combination of financial and technical skills needed for the preparation of sound EE business plans are largely missing in Bulgaria. Typically there is weak commercial orientation among technical staff and a widespread lack of understanding of financial packaging of projects and isolation from financial institutions. An organization with a limited history of commercial borrowing will almost inevitably also have limited experience in developing compelling business plans. SMEs are too small to have specialist staff experienced in business plan preparation. A poorly constructed business plan is a frequent cause of an otherwise good project being rejected by financial institutions.

Innovative financing, such as energy performance contracting, is hardly used in Bulgaria albeit it can be effective in attracting the necessary capital, often for projects that are deemed too small or risky for financial institutions. This may require "project pooling" by a third party where projects that are individually too small to justify an energy performance contracting arrangement are bundled to make a financially viable package. However, there is no mature and competitive energy service industry in Bulgaria, with most of the private energy service companies (ESCOs) having small operations and balance sheets. They tend to suffer from insufficient credibility and trust by both the energy users and the financial institutions that they can deliver the promised energy/financial savings.

There is a financing vicious circle, whereby the low credibility and reputation of small ESCOs prevent them from attracting financing partners, let alone receiving competitive financing terms from commercial banks. Modern project-finance concepts (e.g., off-balance sheet financing, equipment leasing) are not widespread. This results in typically higher cost of capital and in the inability to hedge the uncertainty of energy savings.

The availability of credit guarantees for performance contracting could be a factor in reducing the credit risk profile of energy performance contracts and hence in assisting such projects to have access to commercial lending at market interest rates.

Weak financial incentives for end-users can also be considered as a serious barrier. In Bulgaria, energy consumption has long been subsidized, with end-user prices kept below full cost-recovery levels for some consumer groups. This has encouraged inefficient or downright wasteful consumption patterns.

In Bulgaria companies are faced with poor access to commercial financing for energy efficiency and renewable energy projects. Normally a project investment is financed with own means and commercial loans. In Bulgaria commercial loans are hardly accessible, because interest rates are high (> 12%), tenures are short (3 – 5 years) and a high share of securities is requested (>150% of loan amount). EBRD's BEERECL facility offers loans with a longer tenure and a grace period as well as less collateral coverage. Also direct subsidies are needed to tackle the undercapitalisation of Bulgarian companies, enabling those to provide securities to the Bank. Companies can receive additional cash flow by selling CO_2- credits. They improve their cash flow and add to the feasibility of the project.

At company level the argument of opportunity costs is important. Investments in other measures generate a better pay back, so investments in energy efficiency do not happen. Because of the low energy prices, energy efficiency is not an issue for most companies. In other words: if it would be very profitable, many companies would already have invested in energy efficiency. A clear decrease of the ratio of energy consumption in relation to GDP would already have been visible.

Rapid growth of GDP, credit expansion, and the inability to carry out monetary policies because of the currency board arrangement make it difficult to keep prices stable in Bulgaria. Predicted inflation for the period between 2007 and 2009 is close to the maximum permitted by the Maastricht Treaty. Each unexpected price increase will threaten the proposed JI projects. Last year, inflation was 6.5 per cent.

(b) Prevailing practices

Information on EE technologies, the effectiveness of EE measures, project development and financing techniques is largely lacking in Bulgaria, partly because of the lack of strong institutional focal point within the government for effective information dissemination, including "good practices." The lack of good information to consumers, the energy service sector and the financial institutions means that many cost-effective opportunities for EE investments are missed.

Lack of awareness on modern technologies for energy efficiency improvements can impede a successful implementation of the projects. Such barriers do not exist for coal-based power projects (the alternative) as the technology is quite proven and used by many local players. At the national level, major capacity contribution to the grid is from coal-based projects whereas the capacity from gas-based projects is a minor contribution.

The advanced technology is not business-as-usual activity and contribute to less than 0.5% of the national installed capacity. However, since all investments improve the current situation and improve the environmental performance of the sites, these risks are envisaged as very low.

Government energy policies in Bulgaria were heavily supply-oriented, emphasizing increased energy production and positioning the country as energy center of the Balkans. EE policies were largely based on top-down administrative and legal regulation (standards, consumption quotas, labels, etc.) and failed to tackle the country's serious EE problems in a comprehensive manner. There was a virtual lack of central responsibility for EE policy and implementation with the state Energy Efficiency Agency (EEA) unequipped with adequate policy-making capacity and failing to act as a national center of excellence for EE. Furthermore, even most of the identified EE projects remained unimplemented due to serious shortage of funding and the lack of EE finance market. The reform-oriented government in office since 2001 is undertaking serious efforts to address this legacy by moving (i) from policy formulation to implementation; (ii) from a focus on supply side EE to the demand side; (iii) from isolated EE projects to coherent programs; (iv) from an ineffective central EEA to a national center of excellence in policy and implementation; and (v) from almost exclusive funding from the government and bilateral donors to an EE finance market.

Reform of the Bulgarian energy sector started in 2000. It began with the organisational restructuring of the National Energy Company (NEC). New energy companies were set up, divided into three groups: companies producing energy, a company transmitting energy (the former NEC), and companies distributing energy to the consumers. Without rejecting the possibility of private capital entering the energy sector, there exists a threat that the change of ownership will bring problems. Analyses of energy sector privatisation in other countries show more negative than positive results, with the Hungarian experience regarded as especially indicative. Reports from leading experts, international financial institutions and even United Nations commissions show that, in general, privatisation of the energy sector results in numerous negative effects that could also negatively affect the three proposed projects. For example:

- The new owners do not aim at long-term investment, but seek rapid high profits. As a result the technical problems of energy systems increase and in some cases there are even major failures of energy supply;
- Various mechanisms are used to export the income generated to other countries;
- In many cases the privatised companies change owners several times. Sometimes, this leads to situations whereby the privatised energy companies become the property of companies that have financial problems or are even bankrupt;
- The expected effect of ending monopoly situations is not attained. On the contrary, ownership is concentrated in a narrowing circle of investors. The state monopoly is replaced by private monopoly and competition does not appear; and

- In most cases, the desired reduction in prices is not achieved. As a whole, electricity prices may even increase.

The attained growth of the electric power in 2003 (+4,1% compared with the preceding year) and the established decrease of the gross electric power production in the Republic of Bulgaria by 0,4 %,is an indicator for the obtained results from the measures undertaken for the enhancement of the efficiency in the electric power sector. The result is higher energy efficiency of the process of transformation during the electric power production by nearly 1% compared with 2002.[5] The tax system is promoting energy efficient technologies and technologies aimed to reduce GHG. If this tendency will continue, it could happen that the proposed projects will not be considered as additional. However this risk has been envisaged as very low, taking into account the fact that the process of improvements of the energy efficiency in industry is slow and depends not only on promotion, but also on other factors such as energy prices, privatization or political stability.

Bulgaria is an associated member of the European Union and its energy and environmental policy is being adapted to the EU framework. This requires radical institutional restructuring of the country's energy sector based on liberalisation, limited public intervention reduced to protection of the public interest and consumer protection.

The total installed CHP capacity is 1485 MWe, which is 26% of the thermal power plant installed capacity. Most of the CHP capacity is in the district heating and industrial sectors. There is no CHP with gas turbine and the total output of gas engine based CHP is only 0,8 MWe. However among the case studies collected for Bulgaria are examples of forthcoming gas engine CHP projects. Most of the CHP units use lignite or coal. In the last years new CHP plants were not constructed. The main reason is that the Bulgarian economy is in the process of restructuring and it is therefore not possible to secure the long-term consumers needs and interest for investment for this activity.

Promotion of new CHP installations has been included in the Energy Strategy of Bulgaria up to the year 2010. The conditions in favour of CHP are as follows:

- The new Energy and Energy Efficiency Law providing that the "single buyer" (electricity transmission company) is obliged to buy with priority the electricity produced in CHP installations on "preferential" (cross-subsided) prices.
- Restructuring and privatisation of industrial enterprises allowing more flexibility in optimisation of their energy production and consumption
- Decentralisation of district heating companies which will be established as independent municipal entities aiming at their further privatisation
- Introduction of new differential heat prices, regional tariffs and termination of the state subsidies, that will allow the district heating companies to become profitable and self-financing
- increase of electricity prices for household consumers co-ordinated with IMF

---

[5] The facts. Energy Policy, 2003

Almost half of the electricity is produced in the nuclear power plant Kozloduy. Owing to economic crises the energy consumption in the industrial sector has been reduced. Hence there is over capacity in Bulgaria, about 10% of generated electricity is exported.

At present, gas-fired cogeneration is not able to compete with power generation of the National Electricity Company, which uses mainly coal and lignite. The gas prices are high in comparison to coal and lignite prices. There is only one tube and gas supplier. The electricity prices are low and are still cross subsidised (industry consumers subsidy household consumers, and both subsidy heat consumers). The gas supply network is still starting his development.

The gradual liberalisation of the energy prices is due to be completed by 2003-2004.

Another fact that will have influence on the IPP's market position is the planned shut down of two units of NPP Kozloduy by 2003 and another two units after 2006. It means a drop in installed capacity by about 1760 MWe which is 13,2% of the total generating capacity Liberalisation of prices and tariffs allows for privatisation in energy production and distribution sectors to be launched and opens the way for domestic and foreign capital. At present, there is a lack of funds and finance for new cogeneration projects. [6]

State Energy regulatory Commission is in force but transparent and predictable regulating framework should be evaluated as well.

Considering the four CHP development scenarios in the Future Cogeneration study for Bulgaria the current situation means that the Post Kyoto World scenario is not likely to be realised. The progress in energy sector restructuring is unsatisfactory and there is a lack of funds to introduce new technologies. New investments will only be possible with involvement of foreign investors. Hence the Present Policies scenario is the most likely. It means that only modest growth of cogeneration can be expected. (Taking into account the fast start of household gasification in big towns and the future energy prices increase a change is possible speeding CHP spread instead of HOB only). There is large technical potential for CHP in the industry and district heating. However, under the current conditions (energy prices) only investment in cogeneration for auto-producers in industry as a way of electricity bill reduction is economically viable. The feasibility of these projects will depend on the evolution of restructuring. In the district heating sector most of which still is in state ownership the potential can be realised mainly with direct governmental or municipal financial assistance or promotion of private investors.

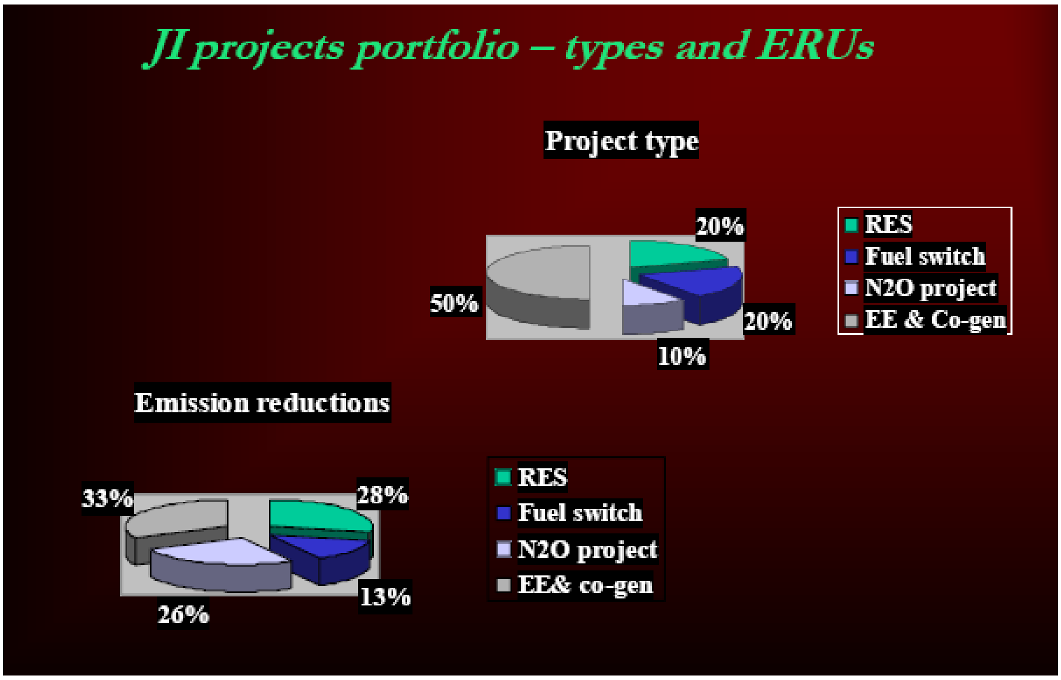
Threre are several programs in Bulgaria established to support energy sector in its struggle to promote the energy efficiency projects. The Energy Efficiency Agency (EEA) is an executive agency of the Ministry of Energy and Energy Resources. It develops programs and projects for improvement of energy efficiency and electric and heat power generation by renewable power sources. It monitors and coordinates energy efficiency programs, analyses and summarizes the results of concrete projects related to the preparation of National Energy Balance. The Energy Efficiency Agency is a legal budgetary entity to the Minister of Energy and Energy Resources.

[6] http://www.kape.gov.pl/

The Energy Efficiency 21 project is an other programme. It represents a region-wide project to enhance trade and co-operation in energy efficient, environmentally-sound techniques and management practices in order to help close the energy efficiency gap between actual practice and best technologies, and between ECE countries, in particular market developed countries and economies in transition. It is the successor of the Energy Efficiency 2000 Project that was launched in 1991.
The Project supports the efforts of Central and Eastern Europe and CIS countries to enhance their energy efficiency and security to ease the energy supply constraints of economic transition. EE 21 assists these countries in meeting international environmental treaty obligations under the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Economic Commission for Europe (Un ECE).
Under its framework there are 14 Energy Efficiency projects developed and implemented sins 1994. The projects concern energy efficiency in buildings, heat supply and energy efficiency in the street lightning.

There are also 39 projects concerning energy efficiency, that have been developed and implemented by the Center for Energy Efficiency EnEffect. EEffect is a non-profit NGO, established in 1992 The projects developed by EnEffect are funded by US, European, Japanese, international and Bulgarian organizations. The US Agency for International Development, the European Commission, the United Nations, the Global Environment Facility, and the Regional Environmental Center are sponsors of the most significant projects implemented by EnEffect.

With good JI potential, a proven track record of government support to JI projects and improving investment climate, Bulgaria is as ever attractive for JI investment. The country's appetite for JI remains high as a strong pipeline backed by supportive legislation and officials is taking shape. Bulgaria signed a Host Country Umbrella Agreement with the PCF and also MU with Austria, Denmark, the Netherlands and Switzerland.



Bulgarian companies have signed ten emissions reduction purchase agreements (ERPAs) so far. From the ten projects only three concern co-generation.

Analysing the potencial of energy savings in the sector, those amounts of implemented projects is not really impressive. As said before, Bulgarian energy efficiency policy is still underdeveloped and meet many financial, technical and administrative barriers.

(c) Other

Energy use per GDP in Bulgaria is very high compared to other European countries. There are still not much improvements in the sector. Even the European Commission, reviewing Bulgaria's Energy Strategy (2002), stated: "the strategy does not yet define an active policy to improve energy efficiency"[7]. For development of new energy efficiency projects this could be an important barrier. However, during the past few years Bulgaria puts in place legislation to regulate most of the existing environmental problems. The political and legal development in the country is very dynamic. It is therefore expected that energy efficiency projects will get more attention in the future, stimulated by high energy prices, dependency on fossil fuel imports and a high pressure of the European Union to activate the changes in the policies on improvements in the energy sector.

In the energy sector, Bulgaria is confronted with a series of major challenges stemming from both objective causes and circumstances and the delay in carrying out the reforms during the years of transition.

[7] Taken from the EC's Assessment on Bulgaria's energy policy in October 2002.

Bulgaria is heavily dependent on energy as it imports more than 70% of its primary energy sources. The only significant domestic energy source is low-quality lignite coal with high content of sulphur. Bulgaria is mainly reliant on energy sources from Russia: oil, natural gas, high-quality coal and nuclear fuel. This structure of the energy balance causes concern in terms of the security of energy supply. In a view of a new Russian conflict [8] the project in Sugar Pants and Zebra, aiming electricity production based on natural gas, are very harmful. If the prices for natural gas will drastically grow, as in Ukraine, the projects will not be financially feasible. It is therefore a big concern of the project developers.

The prices of energy to household users will increase in three steps over the next three years by an aggregate 50 per cent, according to an additional memorandum between the Bulgarian Government and the International Monetary Fund (IMF). This was announced by Finance Minister Milen Velchev and IMF Mission Leader for Bulgaria Jerald Schiff at a press conference last Thursday, called to review the results of Schiff's visit to Bulgaria.[9]

Bulgaria continues to meet the political criteria as a candidate country wishing to join the EU. However, despite progress a number of shortcomings still exist. Enhanced efforts are needed to improve the functioning of the JI administrative structure. The complementarities of the various emissions trading schemes is still unclear for the ministries and there is a need for capacity building. There are JI projects in Bulgaria that have received a national approval, i.e. *Bulgaria, Reduction of Greenhouse gases by connecting Sofia Municipality to the natural gas grid, ERU04/01 or Bulgaria, Reduction of greenhouse gases by gasification, ERU03/29*. However, the uncertainty of the approval reminds relatively high.

The calculations of the emission factor for electricity have been based on historical data. Information provided by NEC has contained predictions for energy based on increased usage of natural gas. Taking into account mentioned in the point (v) conflict and treat of growing prices of natural gas, it is very unlike that these predictions are correct. Furthermore, no concrete plans or targets for renewable energy have been approved by the Bulgarian government, as well as no plans concerning nuclear power plants. The calculated CEF is thus based on energy produced in majority on coal and thus relatively high in comparison with CEF calculated by NEC. It should be therefore carefully reviewed before any guarantee is given for quantities of carbon credits to be delivered.

(d) Assumptions

Compared with the vast majority of the European countries, Bulgaria is an outlier in terms of energy intensity of the transition economies in Europe. The extreme energy inefficiency is due in part to specific circumstances of Bulgaria, including over-stimulated electricity demand because of historically heavy reliance on grossly underpriced electricity for heating, the virtual lack of low-pressure natural gas market and delays in modernizing the district heating systems. Consumption of electricity is particularly wasteful. In 2001, Bulgaria's

---

[8] NOS News, 02 January 2006: due to the recent conflict between Russian Federation and Ukraine concerning price for sully of the natural gas, many countries in Eastern Europe are putted in a difficult situation.

[9] http://www.sofiaecho.com

electricity intensity of GDP was seven times higher than the OECD average, four times higher than that of Hungary and Turkey, and 60% higher than that of Romania.

Mirroring the large energy inefficiency, the environmental impact of Bulgaria's economy is disproportionately high. In terms of CO_2 emissions per unit of GDP, Bulgaria is surpassed only by Russia and Ukraine among the European transition economies. Inefficient energy utilization is one of the reasons for the existence of environmental "hot spots" in the country (e.g., Devnya, Maritsa-Iztok, Galabovo-Radnevoya) where ambient air quality often does not meet national and World Health Organization standards.

Energy efficiency and rational utilization of energy resources has always been and remains among the most important priorities of the Bulgarian energy sector. It should be mentioned, however, that until now there have unfortunately been no real results. This is mainly because responsibility has been held in separate departments and the price of the energy resources - electricity, coal, natural gas, etc. has not been based on market principles.

Experience learn that even in countries where the local financial market has sufficient size and liquidity, consumers and investors may have limited access to local financial institutions due to perceptions of high risk, high transaction cost, lack of institutional infrastructure and project development capacity or lack of awareness regarding technologies and their technical/financial performance characteristics. Supporting financial intermediaries and providing risk-sharing instruments to financial institutions (credit risk guarantees and other contingent finance instruments) can be cost-effective ways of addressing these barriers.

The approval and registration of the project activity as a JI activity, and the benefits and incentives derived from the project activity, will alleviate the financial hurdles and other identified barriers and thus enable the project to be undertaken.

Registering the project as a JI project will attract foreign investors' attention and might bring more sustainable capacity to operate successfully on the Bulgarian electricity power market.

JI registration results in reducing inflation/exchange rate risk affecting expected revenues and attractiveness for investors. Transaction risk is the risk that the value of a cash flow in foreign currency, measured in the company's functional currency, will change due to a change in exchange rate. This definition indicates that this involves cash flow in a foreign currency, where the value of this cash flow in the functional currency can fluctuate between the moment the cash flow is announced and the moment the transaction actually takes place.

The proposed project will help enable Bulgaria to meet its obligations under the United Nations Framework Convention on Climate Change (UNFCCC). Bulgaria ratified the UNFCCC in March 1995. Bulgaria signed a Host-Country Agreement with the Bank's Prototype Carbon Fund (PCF) and is implementing a biomass utilization project with PCF support.

The project will also contribute to achieving the Government's objectives under its Environmental Strategy and Action Plan (approved in 2001) in which the huge potential for EE improvement was identified as a key target area for GHG reduction. The Ministry of Environment and Water expresses its strong support for the project.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

All the relevant emissions for the baseline, have been analysed in the table below:

Sugar Plants

Installation	Direct Project Emissions
ECO 1 where boundaries are defined by elements of the reconstructed steam boiler PK-35-39 No 3	CO_2 from coal and natural gas fuel supply process and avoided heavy fuel emissions
ECO 2 where boundaries are defined by TG1, TG2, heat exchangers with and heat transmission network are within the project boundaries	CO_2 from electricity production and transmission

Also refer to pages 18 and 19 for the project flow chart.

Zebra

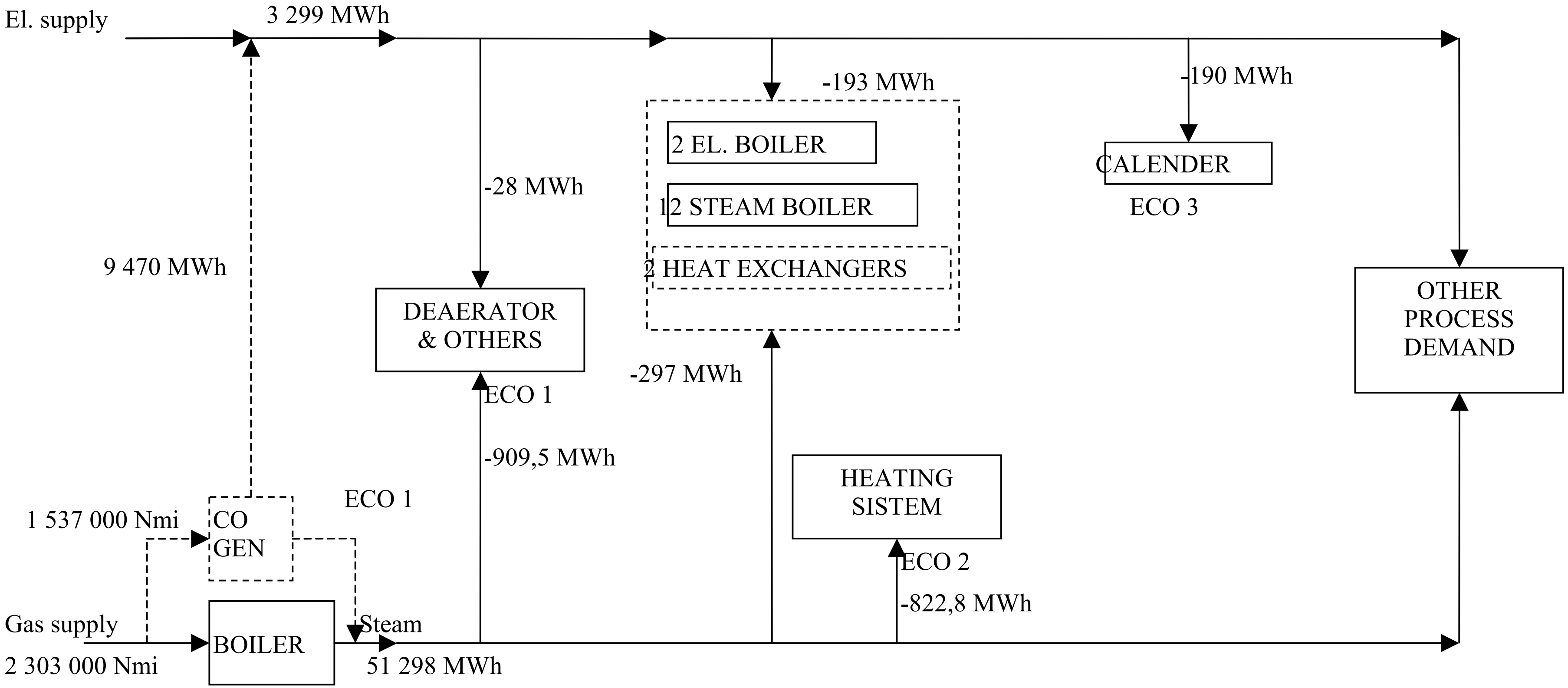
Installation	Direct Project Emissions
Natural gas supply equipment Electricity supply equipment Water purification system Steam boiler Fuel supply equipment to the boiler Gas motor cogeneration module De-aeration devices and the distribution pipeline system for steam transport Calender engine/frequency controlled engine	CO_2 from natural gas fuel supply process and CO_2 from electricity production and transmission, related to steam demand.

A flow chart on the next page shows the baseline and project boundaries (the new equipment is shown in dash lines.

FLOW CHART "ZEBRA"
FLOWS – 2004 DATA

Demand reductions – ENERGY AUDIT 2005 ESTIMATES, based on 4 years records

Total steam demand reduction 2029 MWh (14,2 %)
Total electricity demand reduction 411 (12,5 %)



The 2005 energy audit of the company, based on the computerized energy management system data for the years 2002 -2004 has identified the intervention processes:

- ECO 1: Implementation of combined steam/power production with expected electricity production of 9,470 MWh/yr. The expected electricity production is based on the steam demand and calculations. Within this subproject the replacement of the existing water treatment and de-aeration devices and blow down utilization are incorporated with an effect of gas demand reduction of 147.000 Nm3 and electricity demand reduction of 28 MWh;
- ECO 2: Utilization of waste heat for process and heating purposes by installation of steam-hot water substations. The energy audit estimate is for gas demand reduction of 133.000 Nm3;
- ECO 3: Replacement of the Calander engine with frequency controlled engine, that results in reduction of the hourly electricity consumption of the line from 0.293 to 0.220 MWh/h and expected annual electricity demand reduction of 190 MWh.

The emission reduction is calculated as difference between the baseline and project scenario emissions.

Pirinplast

The project boundary for Pirinplast involves only part of the production process, the part of the injection moulding machines and their electricity consumption.
The measured electricity consumption of the new moulding machines need to be monitored during operation.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

DHV
Laan 1914 no.35
3818 EX Amersfoort
The Netherlands
Mr. H.J. Wijnants
Tel. +31 33 468 2917
Fax +31 33 468 2801

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

Sugar Plants :July 2004
Zebra AD :July 2005
Pirinplast :March 2005

C.1.2. Expected operational lifetime of the project activity [10]:

Sugar Plants – eight (8) years
Zebra and Pirinplast – seven (7) years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

Not applicable

C.2.1.2. Length of the first crediting period:

Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

AAUs:

Sugar Plants : First stage: October 2005; Second stage October 2006 - 31st December 2007
Zebra : October 2006 - 31st December 2007
Pirinplast : June 2005 - 31st December 2007

Crediting period:

---

[10] At least till end of the Kyoto period

1st January 2008 – 31st December 2012

C.2.2.2. Length:

Kyoto period: five (5) years.

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

In accordance with paragraph 28 of the simplified modalities and procedures for small-scale CDM (JI) project activities, a simplified monitoring methodology is used.

D.2. Justification of the choice of the methodology and why it is applicable to the project activity:

This monitoring methodology covers project activities aimed at energy efficiency. The applicability criteria are the same as for the Baseline Methodology and this is outlined in the Chapter B1.1 and is therefore not repeated here.

D.3. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

Sugar Plants									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
MEC_{NG}	Natural Gas	Volume of natural gas consumed	m^3	m	Monthly	100%	Electronic	During the project duration	-
EQ_{import} EQ_{export}	Electricity quantity	All electricity imports and electricity exports to the project electricity system, leading to the net electricity imports	kWh	c	Yearly	100%	Electronic	During the project duration	-
EFC	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected Electricity systems (if imports occur)	tCO_2 / mass or volume unit	c	Yearly	100%	Electronic	During the project duration	-
C_y	Coal	Tons of coal consumed	t/year	m	Yearly	100%	Electronic	During the project duration	-
HO_y	Heavy Oil	Tons of heavy oil consumption	t/year	m	Yearly	100%	Electronic	During the project duration	-

Sugar Plants									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EE	Energy efficiency	Efficiency of boilers where thermal energy is generated in the absence of the project by combustion of fossil fuels	GJ/year	c	Monthly	100%	Electronic	During the project duration	-
CE	Calorific enthalpy	Net calorific value of the fossil fuel	GJ per mass or volume unit	c	Baseline emissions due to the displacement of thermal energy. Once at the beginning of a crediting period	100%	Electronic	During the project duration	-
SP	Steam production	Quantity of steam produced by boiler	t	m	Monthly	100%	Electronic	During the project duration	
SD	Steam demand	Quantity of steam used by 2 heat exchangers	t	m	Monthly	100%	Electronic	During the project duration	

Zebra									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
MEC_{NG}	Natural Gas	Volume of natural gas consumed	m^3	m	Monthly	100%	Electronic	During the project duration	-
EFC	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected Electricity systems (if imports occur)	tCO_2 / mass or volume unit	c	Yearly	100%	Electronic	During the project duration	-
SP	Steam production	Quantity of steam produced by CHP	t	m	Monthly	100%	Electronic	During the project duration	
OH	Time in hours	Amount of operating hours of Calandar engine	hrs	m	Monthly	100%	Electronic	During the project duration	

Pirinplast

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EQ_{import}	Electricity quantity	Electricity imports to the project electricity system	kWh	c	Yearly	100%	Electronic	During the project duration	-
EFC	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected Electricity systems (if imports occur)	tCO_2 / mass or volume unit	c	Yearly	100%	Electronic	During the project duration	-

D.4. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHG within the project boundary and identification if and how such data will be collected and archived:

Sugar plants									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EF_y	Emission factor	CO_2 emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as a weighted sum of emission factors of OM BM
EM_OM_y	Emission factor	CO_2 operating margin emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as indicated in the relevant OM baseline method above
EM_BM_y	Emission factor	CO_2 build margin emission factor of the gird	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as $[\sum_i F_{i,y} * COEF_i / \sum_m GEN_{m,y}]$ over recently built power plants defined in the baseline methodology
$GEN_{j/k/ll,yIMPORTS}$	Electricity quantity	Electricity imports through the project electricity system	kWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics

Sugar plants									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
$GEN_{j/k/ll,yEXPORT}$	Electricity quantity	Electricity exports through the project electricity system	KWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics
$COEF_{i,j,y}$	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected electricity systems	tCO_2/mass or volume unit	c	Yearly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics, if local statistics are not available, IPCC default values are used to calculate
SP	Steam production	Quantity of steam produced by boiler	t/year (tons steam)	m	Weekly	100%	Electronic	During the crediting period and two years after	
C	Coal used	Quantity of coal used	t/year	c	Yearly	100%	Electronic	During the crediting period and two years after	Obtained from Energy Efficiency audit: ratio is 16,78% ton coal per ton steam

Sugar plants									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
HO	Heavy fuel oil used	Quantity of heavy fuel oil used	t/year	c	Yearly	100%	Electronic	During the crediting period and two years after	Obtained from Energy Efficiency audit: ratio is 0,42% ton heavy fuel oil per ton steam

Zebra									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EF_y	Emission factor	CO_2 emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as a weighted sum of emission factors of OM BM

Zebra									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EM_OM_y	Emission factor	CO_2 operating margin emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as indicated in the relevant OM baseline method above
EM_BM_y	Emission factor	CO_2 build margin emission factor of the gird	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as [$\sum_i F_{i,y}*COEF_i/\sum_m GEN_{m,y}$] over recently built power plants defined in the baseline methodology
$GEN_{j/k/ll,yIMPORTS}$	Electricity quantity	Electricity imports through the project electricity system	KWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics
$GEN_{j/k/ll,yEXPORT}$	Electricity quantity	Electricity exports through the project electricity system	KWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics

Zebra									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
$COEF_{i,j,y}$	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected electricity systems	tCO_2/mass or volume unit	c	Yearly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics, if local statistics are not available, IPCC default values are used to calculate
SP	Steam production	Steam produced by CHP	t/year	m	Yearly	100%	Electronic	During the crediting period and two years after	
NEP	Electricity produced	Net electricity production of CHP	MWh/year	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated per year as GEN_{export} - GEN_{import}

Pirinplast									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
EF_y	Emission factor	CO_2 emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as a weighted sum of emission factors of OM BM
EM_OM_y	Emission factor	CO_2 operating margin emission factor of the grid	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as indicated in the relevant OM baseline method above
EM_BM_y	Emission factor	CO_2 build margin emission factor of the gird	tCO_2/MWh	c	Yearly	100%	Electronic	During the crediting period and two years after	Calculated as $[\sum_i F_{i,y} * COEF_i / \sum_m GEN_{m,y}]$ over recently built power plants defined in the baseline methodology
$GEN_{j/k/ll,yIMPORTS}$	Electricity quantity	Electricity imports through the project electricity system	KWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics

Pirinplast									
ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is the archived data kept?	Comment
$GEN_{j/k/ll,yEXPORT}$	Electricity quantity	Electricity exports through the project electricity system	KWh	c	Monthly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics
$COEF_{i,j,y}$)*	Emission factor coefficient	CO_2 emission coefficient of fuels used in connected electricity systems	tCO_2/mass or volume unit	c	Yearly	100%	Electronic	During the crediting period and two years after	Obtained from the latest local statistics, if local statistics are not available, IPCC default values are used to calculate
NCM	Number of corrugated materials	Quantity of products produced	number	m	Weekly	100%	Electronic	During the crediting period and two years after	Annual production is the sum of all weekly production numbers in one year
NOP	Number of total products	Quantity of products produced	number	m	Weekly	100%	Electronic	During the crediting period and two years after	Annual production is the sum of all weekly production numbers in one year

D. 5. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Determining $EF_{OM,y}$

The chosen methodology provides 4 ways of computing OM emission factor, in which Dispatch Data Analysis is not applicable in that the dispatch data of the power grid operation are difficult to obtain. For the same reason simple adjusted OM method proves inapplicable. Also, Average OM method can not be applied in that the structure of Bulgarian Power Grid depends predominately on coal. Power with wind power in its initial stage and, hydro-power, a low-cost and indispensable resource in the Bulgarian Power Grid, diminishing.
For the above reasons the Project chooses simple OM method in the computation of the emission factor for operation margin (OM) in that the percentage of the power yield from the low-cost or obligatory sources is far below 50% in the total electricity quantity.

Simple OM emission factor ($EF_{OM,simple,y}$) is the specific emission of power yield (tCO_2/MWh) by average-weighing the electricity quantity from all generation sources that serve the system, excluding power plants under low-cost or obligatory operation.

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}}$$

Where:
$F_{i,j,y}$ represents the amount of fuel "*i*" consumed during the year "*y*" by the corresponding power source "*j*"
j: marker for the power resources of the power grid, excluding power plants under low-cost or obligatory operation but including external input of the grid
$COEF_{i,j,y}$: CO_2 emission coefficient for fuel "*i*" (tCO_2 / fuel mass), taking account of the carbon content and oxidation ratio of the fuel used by power source "*i*" during the year "*y*"
$GEN_{j,y}$: power (MWh) supplied by resource "*j*" to the power grid

The CO_2 emission factor for fuel "*i*" can be obtained using the following formula:

$COEF_i = NCV_i * EF_{CO2,i} * OXID_i$

Where:
NCV_i: net calorific value (energy content) for specific mass or volume
$OXID_i$: oxidation ratio of the fuel
$EF_{CO2,i}$: CO_2 emission factor for specific energy of fuel "*i*"

Using the average data values of the latest 3 years obtained, it is computed that the OM emission factor of Bulgarian Power Grid is:

$EF_{OM,y}$=1.221

Determining $EF_{BM□y}$

As specified in the baseline methodology, the OM of a power grid is the emission factor, the weighed average of power output of “m (number)” sample plants that have impact on the grid capacity construction of a power grid:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_{m} GEN_{m,y}}$$

Where,

$F_{i□m□y}$, $COEF_{i□m}$ and $GEN_{m□y}$ basically mean the same variables as in the above-mentioned simple OM, while referring to power sample “*m*”.

The Project proponents should choose one out of the following alternatives:

Alternative 1: An ex-ante computation of BM emission factor and establishment of sample group “m” based on the latest information regarding the existing plants or the ones under construction obtained in the process of submitting PDD.

Alternative 2: Ex-ante yearly renewal must be made to BM emission factor, $EF_{BM□y}$, during the first crediting period.

With regard to sample group “m” the one with the bigger annual power yield is to be chosen within the two as sample group:

· 5 power plants of the latest construction, or
· The newly-added installed capacity in the power system is newly completed and and makes up 20% in the power output (MWh) of the system.

Considering that coal power in Bulgaria is still in its growing stage and the Project developers calculate $EF_{BM,y}$ with conservation, the Project choose alternative 1: Provide an ex-ante computation of BM emission factor and choose 5 power plants of the latest construction as a sample group for BM. Based on the above formulae, it is computed that the BM emission factor for Bulgarian Power Grid is:

$EF_{BM□y}$=1.177

Determining $CEF_{electricity□y}$

The emission factor Efy, i.e., $CEF_{electricity□y}$, is the weighed average of OM emission factor ($EF_{OM,y}$) and BM emission factor ($EF_{BM□y}$) :

$EFy=\omega_{OM} * EF_{OM,y}+\omega_{BM} * EF_{BM□y}$

Where: the defaults of the weighing, ω_{OM} and $\omega_{BM,}$ are both 50% ($\omega_{OM}=\omega_{BM}=0.5$)

Then, $EFy= \omega_{OM} * EF_{OM,y}+ \omega_{BM} * EF_{BM□y}$
=0.5 * 1.221+0.5 * 1.177
=1.199 tCO_2/MWh□

Therefore, GHG emission reductions from displacing or avoiding other energy sources for grid-connected power generation can be computed using the following formula:

$BE_y = E_{Gy} \times CEF_{electricity,y}$

In which:
BE_y: GHG emission reductions by substituting or avoiding other energy sources for grid power generation during the year *y*
EG_y: net electricity quantity supplied to the grid (in GJ) during the year *y*

Where:
$EGy = 0.90 \sum EGh$

In which:
EGh: power yield per hour by the Project activity, i.e., the installed capacity (in *MWh*)
h: the number of hours in operation for power generation, 7,000 hours annually is set by the Project
0.90: 90% of the power yield supplies to the grid with 10% covering the project power waste and network losses

Because the proposed projects are reducing their use of electricity from the grid, the transport losses were included in the emissions reductions calculations. The transport loss in 2003 was more than 14%, in the calculations 10% has been taken as a conservative approach.

For historical data and projections for the electricity generation, CO_{2eq} emissions from electricity generation and the emission factors, please look at attached Annex 4.

Determining total baseline emissions:

Sugar Plants

i. emission factor for displacing electricity has been described here above

ii. measurements for coal and heavy fuel consumption take place and emission reductions are calculated on basis of these measurements multiplied with emission factors for coal and heavy fuel from IPCC tables (Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories)

iii. in the project scenario consumption of the natural gas will increase and consumption of the fossil fuels will decrease.

Baseline emissions are calculated as follows:

SP_y x ratio HO/ SP_y x $CEF_{IPCC,HO}$ + SP_y x ratio C/ SP_y x $CEF_{IPCC,C}$ + SP_y x ratio MWh/SP_y x $E_{Gy} \times CEF_{electricity,y}$

For this company the baseline is calculated based on steam output and fuel input. In the baseline situation the boiler PK-35-39 is fuelled by coal and heavy fuel oil (HFO). The produced steam is delivered to generators, to produce electricity. As ECO1 is defined, the oil burners will be modified to switch to natural gas. The steam production will remain the same. Gas will replace heavy fuel oil consumption completely. For the baseline calculation the amount of steam produced by the boiler will determine the baseline coal consumption, by using the ratio of ton coal consumption per ton steam of 16,87%. To calculate the HFO consumption, the baseline ratio of HFO to steam is used of 0,42%. The turbine TG1 will be replaced by a new turbine TG2, generating electricity more efficiently. The steam production remains the same, so more electricity is self produced, leading to less electricity consumption from the grid. To calculate the baseline consumption of electricity from the grid, the amount of steam produced will be multiplied by 0,32 to calculate the total own production. The total own production will be multiplied by 0,26 to calculate the *net* amount of electricity purchased from the grid. ECO2, the baseline remains the same, since the amount of steam produced is assumed to be constant.

Project emissions:
ECO2: The efficiency gain of the heat exchangers will lead to 5.84% less coal use in the steam generator in addition to the implementation of ECO1. So the coal consumption needs to be measured.

Zebra

i. emission factor for displacing electricity has been described here above

ii. measurements for coal consumption take place and emission reductions are calculated on basis of these measurements multiplied with emission factors for coal and heavy fuel from IPCC tables (Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories)

iii. in the project scenario consumption of the natural gas will increase and consumption of the fossil fuel will decrease.

Baseline emission calculated as follows:

MEC_{NG} x $CEF_{IPCC,NG}$ + C_y x $CEF_{IPCC,C}$ + NEC MWh/y x $E_{Gy} \times CEF_{electricity,y}$ + MWh/y x $E_{Gy} \times CEF_{electricity,y}/0.90$

In Zebra part of the produced electricity will be sold to NEC and part of it will be used on-site. Therefore, no electricity losses have been calculated for the part of self-used electricity.

For Zebra 3 measures are proposed, for which a baseline calculation method is prepared. For ECO1, the baseline is calculated using the gas consumption (in Nm3) per ton steam, produced by the CHP. This ratio is 96, meaning that total steam production multiplied by 96 will lead to the gas use in Nm3. For ECO2, the same ratio calculation can be applied to the gas used by the new heating system using waste heat. In addition, the baseline for ECO1 for electricity will be calculated using the calculated total electricity consumption AND the measured net electricity produced by the CHP in the projectscenario.
For the last measure, ECO 3, the frequency controlled engine Calandar, an energy efficiency improvement of 75% is gained on electricity consumption. The means that the measured energy use of the engine should be divided by 0,75 to calculate the baseline emissions.

For Zebra's project emissions, the measured gas consumption and the net electricity consumption of the CHP should be taken into account. In addition, the net electricity consumption from the grid compared to the baseline situation should be taken into account. For ECO2, the energy saving of gas is a calculated ratio of 4,35 Nm3 gas per ton steam. The working hours of the electrical engine (ECO3) are used to calculate the total energy saving based on the efficiency improvement of the moulding machines (0,073 MWh/h operated).

Pirinplast

i. emission factor for displacing electricity has been described here above

ii. in the project scenario usage of electricity will decrease

Baseline emissions are calculated as follows:

Baseline ratio MWh / average product mix x product mix /yr x EGy×CEFelectricity,y

The baseline ratio is calculated to be 5,84 MWh per average of products. The average of products is calculated as the average of the “Corrugated materials” (=largest product line) and “total products” produced in one year.

Project emissions
The electricity consumption is set on 238 MWh per year, based on the technical specifications of the new moulding machines. In order to verify if the baseline method is still valid, also the number of products produced by the moulding machines need to be monitored. If the ratio of “Total Production” and “Corrugated materials from PP” changes significantly (less than 70% or more than 90%), the baseline calculation method need to be modified if it is clear that the changed product output mix has a significant impact on the electricity consumption.

D.6. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

Data *(Indicate table and ID number e.g. 3.-1.; 3.2.)*	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
EQ_{import}, EFC, EQ_{export}, EE, CE	Low	Default data (for factors) and EIA statistics (for energy data) are used to check the local data
EF_y /EM_OM_y / EM_BM_y / $COEF_{i,j,yIMPORTS}$	Low	All factors are calculated by the Bulgarian National Electricity Company (www.nek.bg)
$GEN_{j/k/ll,yIMPORTS}$	Low	The monitoring systems used at Pirinplast complies with ISO 9001, Zebra with ISO 90001, ISO 14001 and ISO 18001, and Sugar Plants uses its manual “Instruction for measurement and documentation of the heat quantities and the accounting of the dhift in the I&C department”

D.7 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

1 Sugar Plants

1. The measurement of the technical parameters - consumption of materials and fuel, temperature of the indicated points in the technological scheme is being performed with electronic devices - for consumption - with flow meters of steam, feed water, the measurement of coal - with electrical band scales. The monitoring and gathering of the data from the respective devices is being performed according to "Instruction for measurement and documentation of the heat quantities and the accounting of the shift in the I&C department" by the respective personnel on duty and the I&C specialists on duty, namely: Rumyana Hristova, Rumyana Mincheva, Rayko Kirilov. The data from the band scales are recorded by the

operators on duty in the coal feed section, namely: Ivo Shubekov, Dimitar Zabrodnev, Mihail Mihaylov, Ivan Stoyanov. The collected data are supplied daily by the shift for analysis in the Production and Technical department to Eng. Raisa Benkova who submits them for control to the director of the TPP Eng. Plamen Kunev. The measurement of coal quantities is performed according the "Instruction for measurement of main and supplementary fuels in I&C department - TPP and the supplied and consumed coal each month are checked by a commission consisting of head of the coal-stock Kremena Todorova, head of department Eng. Anatoliy Botov and chief book-keeper Stefka Minkova. The data are given to Production and Technical department for monthly and annual balance which is supplied for control to the director of the TPP.

2. The training of the personnel which performs the monitoring is accomplished according to a special program that is approved by the director of the TPP for the forthcoming year. The annual training program covers matters with the technical operation of the instrumentation and equipment, the measurement and the operation safety.

3. Procedures are provided for actions in emergency situations according a special instruction "Instruction for prevention and limitation of the emerging of non-organized emissions and their discharge into the atmosphere", "Instructions for prevention of accidents", "Emergency plan" and instruction for the cleaning equipment - scrubbers.

4. An order of the director of the TPP provides:

- calibration of the equipment for control, namely: laboratory manometers for check of operating manometers - once a year to check for fitness by authorized organization "Metrology" in the town Veliko Tarnovo,
- the laboratory thermometers and the operating thermometers are brought to the town Gabrovo once a year for check.
- The laboratory bridges, potentiometers are checked at place by a representative of "Metrology" Veliko Tarnovo.

The check of the rest of the operating devices is performed by an own heat-technological laboratory of the TPP by Yordan Tsonev, Georgi Dimov and Stoyan Velinov and the control is performed by the head of I&C department A. Botov.

5. The operation of disturbances of the normal operation of the equipment is provided in "Instruction for the accounting of the disturbances, examination and determination of the causes for the occurrence of damages". Measures are foreseen for the elimination of the damages and are taken measures not to permit them. In the Internal regulations is written that each month the head of department and his subordinates are preparing a time schedule for repair and maintenance of the equipment entrusted to them, the control of which they are personally performing and are reporting to the director of the TPP. For possible inaccuracies in the monitoring or by outage of the device, e.g. consumption meter, the outage must be eliminated within one working day and the corrections are done in Production and Technical department based on the previous day by the same load of the steam generator or based on the last working hours.

The instruction for monitoring of the disturbance provides also the elaboration of a data base in order to perform analyses and making decisions for increasing the reliability of operation of the equipment and the I&C.

2 Zebra

The chief engineer Mr. Alexandrov is the responsible person for the monitoring. Most monitoring devices are already in place, since staff of Zebra continuously monitors the energy system parameters. A device for monitoring the gas consumption will be installed. Procedures and responsibilities are in line with ISO 9001, ISO 14001 and OHSAS 18001 (health and safety labour conditions).

3 Pirinplast

The chief engineer Stoian Vakareew and the chief energy engineer Kiril Karpuzov are responsible for monitoring. The electricity consumption will be measured by the electric meter of the Regional Electricity Distribution company after project implementation. Both the electricity consumption and production volumes will be recorded in special logbooks. The corresponding accounting documentation and invoices will be copied and attached to the monitoring documentation. Procedures and responsibilities are in line with ISO 9001.

Measurement ucertaintes under project activities:

(a) Also, there are some uncertainties on demand and supply possibilities projections for the natural gas. An important factor in the further development of combined production schemes is the uncertainty about future fuel prices and the need fo,r and value of future electricity generating capacity. The latter affects the revenue to the operator resulting from the sale of excess electricity to the grid (in case of Sugar Plants). It also determines the relative attractiveness of industrial combined production versus the production of heat alone and the purchase of electricity from the grid. The achievability of energy targets of the Sugar Plants and Zebra, given the technical and economic uncertainties, as well as the current level of activities, remain open to question.

(b) In Sugar Plants and Zebra plant natural gas will be used as a fuel for electricity generation. Precise measurement and control of gas injection into the feedstock of a cogeneration plant which generates electricity forms a commont measuremet problem.

(c) In the two proposed projects Pirinplast and Sugar Plants, there are uncertainties of power supply measurements due to lack of power reliability resulting from deregulation of the electric industry (and in consequence resulting in rapid black-outs and power shortages).

D8 Name of person/entity determining the monitoring methodology:

DHV
Laan 1914 no.35
3818 EX Amersfoort
The Netherlands
Mr. H.J. Wijnants
Tel. +31 33 468 2917
Fax +31 33 468 2801

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

Sugar Plants JSC : **125,577 t CO_{2eq}/y**
Zebra AD : **122,681 t CO_{2eq}/y**
Pirinplast : **2,380 t CO_{2eq}/y**

Total : 250,638 t CO_{2eq} in 2005-2012[11]

E.2. Estimated leakage:

The energy efficiency technology is not the existing equipment transferred to another activity and therefore leakage is not to be considered.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

As no leakage is identified, the sum of E.1 and E.2 equals E.1 = **250,638 tCO_{2eq} in 2005-2012.**

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

Sugar Plants JSC : **185,332 tCO_{2eq} in 2005-2012.**
Zebra AD : **174,839 tCO_{2eq} in 2005-2012.**
Pirinplast : **20,067 tCO_{2eq} in 2005-2012.**

Total : 380,237 tCO_{2eq} in 2005-2012

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity[12] :

The project aims to reduce GHG emissions from energy savings and fuel switch. Total emissions reduced by sources = **129,599 tCO_{2eq} in 2005-2012.**

E.6. Table providing values obtained when applying formulae above:

On the next page two tables are presented:
– annual emission reductions per project;
– annual baseline and project emissions per project.

[11] This is not exact, but estimated amount of the CERs
[12] The volume of carbon dioxide actually reduced due to the projects' activities is an indication of the volume of the carbon dioxide that would have been emitted without the proposed projects. This will be monitored. The amounts are approximate.

United Bulgarian Bank

Emissions reduction Energy Efficiency Portfolio, Bulgaria [CO2eq/MWh/y]				
Year	SugarPlants	Zebra	Pirinplast	Total
2005	1.814		1.360	**3.175**
2006	7.543	2.064	2.332	**11.940**
2007	8.400	8.349	2.332	**19.081**
AAUs	**17.757**	**10.413**	**6.025**	**34.195**
2008	8.400	8.349	2.332	**19.081**
2009	8.400	8.349	2.332	**19.081**
2010	8.400	8.349	2.332	**19.081**
2011	8.400	8.349	2.332	**19.081**
2012	8.400	8.349	2.332	**19.081**
ERUs	**41.998**	**41.744**	**11.661**	**95.403**
TOTAL	**59.755**	**52.157**	**17.686**	**129.599**

Emissions for Energy Efficiency Projects [tCO2/y]						
Year	Project Scenario	Baseline Scenario	Project Scenario	Baseline Scenario	Project Scenario	Baseline Scenario
	Sugar plants		Zebra		Pirinplast	
2005	4.576	6.391			183	1.544
2006	18.020	25.563	4.929	6.994	314	2.646
2007	17.163	25.563	19.625	27.974	314	2.646
2008	17.163	25.563	19.625	27.974	314	2.646
2009	17.163	25.563	19.625	27.974	314	2.646
2010	17.163	25.563	19.625	27.974	314	2.646
2011	17.163	25.563	19.625	27.974	314	2.646
2012	17.163	25.563	19.625	27.974	314	2.646
TOTAL	**125.577**	**185.332**	**122.681**	**174.839**	**2.380**	**20.067**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Key permits

Sugar Plants
For ECO 1, no EIA is needed since it is clearly an improvement of energy efficiency, leading to a better environmental performance of the boiler. For ECO 2, the installation of the heat exchanger, no EIA is deemed necessary.

The design is carried out according to national standards regarding the reconstruction of the steam boiler ECO I, as well as the erection of the boiler station. In technical terms, routine activities for the reconstruction of the steam boiler are envisaged. Sugar plant JSC has entered into agreement with the contractors, responsible for the implementation. The terms of the signed contracts, guarantee the correct implementation of the project and its stages. In our opinion, there is no risk of an incorrect project implementation.

Zebra JSC
The environmental staff have analysed the legislation on EIA. In their judgement an EIA is not necessary, since the project is not listed for EIA compliance. The project is already approved by the local authorities.

Pirinplast
For the replacement project no EIA is deemed necessary.

Environmental impacts of the projects:

Noise
Major sources of noise pollution include noise during construction and noise from the equipment installed as part of the Projects. As the three Projects are being built within the centre of an industrial facilities, it has been estimated that these would not be in excess of the noise from construction and operation of the plants. The project sponsors will undertake to ensure that workers on the sites are adequately warned of the dangers of noise exposure and protected accordingly.

Visual Impacts
The visual impact of the Project Activities are likely to be minimal as the major equipment is fitted within the middle areas of the plants and the equipment has a lower height than the main stacks.

Interference with Communications
There is not expected to be an increase in interference with communications as a result of the Project Activities.

Land Use Impacts
There are no land use impacts as the Project Activities are within an existing site which have already been converted to industrial use.

Water Usage Impacts

Approximately 27,123 tonnes of waste water generated annually during the production processes in the Sugar Plants will be chemically purified.

Air Quality Impacts:

Sugar Plants

Due to the replacement of electric energy produced by conventional sources with such generated by the Sugar Plants CO_2 emissions shall be reduced by 78,407 tCO_2eq in 2005-2012.

Implementation of the Sugar Plants project and decrease of the conventional electric energy production will reduce emissions of sulphur, nitrogen oxides and a certain amount of dust. Estimated annual reductions of SO_2 emissions from 2005 to 2012 amount to 645 tons.

Pirintplast

Due to the replacement of electric energy produced by conventional sources with such generated by the Pirinplast CO_2 emissions shall be reduced.

Sulphur dioxide, nitrogen dioxide and a certain amount of dust are emitted from electric energy production from fossil fuels. The implementation of the Pirinplast Jsc Energy Efficiency Project and decrease of conventional electric energy production will reduce these emissions.

In 2006 the SO_2 emissions shall decrease with 6.2 tons and for the period 2005 -2012 they will decrease with 41.7 tons, as a result of the achieved electric energy savings.

In 2006 the NO_x emissions shall decrease with 1 ton and for the period 2005 -2012 they shall decrease with 7.6 tons, as a result of the project implementation.

In 2006 the dust emissions shall decrease with 0.8 tons and for the period 2005 -2012 they shall decrease with 5.5 tons, as a result of the project implementation.

A danger of occupational traumas exists in the operation of the old injection machines, as a big part of the equipment is not safe according to normative documents. Such production accidents had happened at the plant. After the installation of the new equipment, the safety of employees will increase. The machines are designed and manufactured according to the present norms of safe labour. The possibility to program the manufacturing process limits the manual manipulations and provides safety to the employees.

Zebra

The CO_2 emissions will be reduced by 7,547 tons as a result of the 9,470 MWh of electric energy generated from the cogeneration module. For the period 2005-2012, the CO_2 emissions reduction amounts to 49,269 tons, as a result of the project implementation.

The carbon dioxide emissions increase by 2,258 tons as a result of the increased natural gas consumption in the amount of 40,471 GJ/yr. For the period 2005-2012, the CO_2 emissions will increase with 15,773 tons, as a result of the project implementation.

The CO_2 emissions will decrease by 5,289 tons annually and for the period 2005 - 2012 they will decrease by 33,496 tons, as a result of the project implementation.

In 2006 the SO_2 emissions shall decrease with 31 tons and for the period 2005 - 2012 they will decrease with 174 tons, as a result of the project implementation.

In 2006 the NO_x emissions will be reduced with 909 tons as a result of the generated 9,470 Wh electric energy from the CHP, which uses natural gas. For the period 2005-2012, the NO_x emissions reduction amounts to 6,366 tons, as a result of the project implementation.

In 2006 the nitrogen dioxide emissions will be increased with 2 tons as a result of the increased consumption of natural gas in the amount of 40,471 GJ/yr. For the period 2005-2012, the NO_x emissions will increase with 14 tons, as a result of the project implementation.

In 2006 the NO_x emissions shall decrease with 907 tons and for the period 2005 - 2012 they shall decrease with 6,351 tons, as a result of the project implementation.

In 2006 the dust emissions shall decrease with 4 tons and for the period 2005 -2012 their reduction amounts to 25 tons, as a result of the project implementation.

F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

Energy efficiency projects have a positive influence on the environment by reduction of the use of energy from fossil fuels. No adverse environmental or social impacts are associated with the implementation of these projects. The project owners are in contact with their local authorities for approval of their construction activities. All three have started the construction.

All three projects were endorsed by the Ministry of Environment and Water.

SECTION G. Stakeholders' comments

G.1. Brief description how comments by local stakeholders have been invited and compiled:

For the BEERECL facility, two public conferences were organised. The first one in Sofia, Hotel Rodina on June 24, 2004 and the second in Varna, Sveti Konstantin and Elena Resort, International Scholars' House on September, 24, 2004.
Advertisements were made in national and local newspapers, weekly business magazines, internet and radio. Staff of UBB have presented the three projects during these two workshops (see Annex 6).

Stakeholder involvement is very important for all companies. The companies have a clear interest in the well being of the local communities around them, as their workforce mainly comes from nearby communities and workforce clearly is the most important factor influencing productivity. Therefore the companies take care of any comment seriously, especially on environmental issues. Zebra also has open days for the public, two times a year. During these open days the public is informed about the company. So far the project has not been addressed specifically during these open days, however the staff will inform interested visitors when they question environmental or energy issues.

All projects were submitted to the Ministry of Environment and Water in the Project identification Note. A Letter of Endorsement was provided by the Ministry, after the projects were thoroughly reviewed by MoEW's staff regarding their environmental impacts and compliance with the official procedures.

G.2. Summary of the comments received:

There were no comments received.

G.3. Report on how due account was taken of any comments received:

Because there were no comments received, no action has been undertaken.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	United Bulgarian Bank
Street/P.O.Box:	5 Sveta Sofia Street
Building:	
City:	Sofia
State/Region:	
Postfix/ZIP:	1040
Country:	Bulgaria
Telephone:	+359 2 811 2800
FAX:	+359 2 988 08 22
E-Mail:	info@ubb.bg
URL:	www.ubb.bg
Represented by:	
Title:	
Salutation:	Mrs
Last Name:	Malcheva
Middle Name:	
First Name:	Hrisimira
Department:	International Lending Programs, Corporate Banking Department
Mobile:	
Direct FAX:	+359 2 811 2402
Direct tel:	+359 2 811 2229
Personal E-Mail:	malcheva_h@ubb.bg

Organization:	European Bank for Reconstruction and Development
Street/P.O.Box:	One Exchange Square,
Building:	
City:	London
State/Region:	
Postfix/ZIP:	EC2A 2JN
Country:	United Kingdom
Telephone:	+44 20 7338 6000
FAX:	+44 20 7338 6100
E-Mail:	
URL:	www.ebrd.com
Represented by:	
Title:	Manager
Salutation:	Mr
Last Name:	Liese
Middle Name:	
First Name:	Egbert
Department:	Netherlands-EBRD Carbon Fund
Mobile:	
Direct FAX:	+44 20 7338 6942
Direct tel:	+44 20 7338 7177
Personal E-Mail:	LieseE@ebrd.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The BEERECL facility foresees the payment of a bonus, if the project is completed successfully. This bonus, the so called KIDSF grant, is paid or by the Kozludey fund (public fund).

Annex 3

BASELINE INFORMATION

(1) The Central and Eastern Europe Business Information Centre, March 2003

(2) Appendix B of the simplified modalities and procedures for small-scale CDM project activities Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories

(3) Third National Communication on Climate Change, Sofia 2002

(4) South-eastern Europe Country Analysis Brief, March 2005

(5) U.S. Department of Energy Office of Fossil Energy, An Energy Overview of the Republic of Bulgaria, 2005

(6) Rational Energy Utilisation and Financing Plan for Sugars Plant Energy Efficiency Project, June 2004

(7) Rational Energy Utilisation Plan No. 20 Pirinplast Energy Efficiency Project, March 2005

(8) Rational Energy Utilisation Plan No. 25 Zebra Energy Efficiency Project, May 2005

(9) Study on Standard Multi Project Baseline for Joint Implementation Projects in the Bulgarian Power Sector, National Electricity Company (NEK), Bulgaria, 09.05.2005

Annex 4

HISTORICAL DATA AND PROJECTIONS FOR THE ELECTRICITY GENERATION, CO_2 EMISSIONS FROM ELECTRICITY GENERATION AND THE EMISSION FACTORS

Excel tables are provided

Annex 5

CALCULATIONS TO DETERMINE THE EMISSION FACTORS FOR ONE YEAR

INFORMATION OF THE STUDY PERFORMED BY THE NATIONAL ELECTRIC COMPANY (NEK), BULGARIA DATED 09.05.2005

STUDY ON STANDARD MULTI PROJECT BASELINE FOR JOINT IMPLEMENTATION PROJECTS IN THE BULGARIA POWER SECTOR

The study was performed at the request from the Ministry of Environment and Water of Bulgaria. It aims reduction of transaction costs of the JI projects that influence the electricity production and electricity demand in the country.

The applied methodology explores the document of the UNFCCC CDM Executive board ACM0002 “Consolidated Baseline Methodology for Grid-connected electricity generation from renewable sources”.

The results are reported for the historical period 2000 – 2004 and for the future period 2005 – 2012.

The historical data are taken from the records of the National Dispatching Center of the Power Grid and from the annual reports of the electricity producers.

The data for the future period are based on the official Least Cost Development Plan of the Bulgaria Power Sector, reported in 2004. The NEK uses the computer code IRP Manager (Integrated resource planning Manager) that was developed in the United States of America for the purposes of the optimal planning of the power sector and the analysis of the demand side management. The sophisticated software tool allows to model long term period with hourly load diagrams. This allows to get forecast for the annual loading curve by every hour (8760) hours a year) for every of the plants as well as fuel spent.

Table 1. Historical data for the electricity generation, CO2 emissions from electricity generation and the emission factors.

Recorded	Unit	2000	2001	2002	2003	2004
Demand						
Total system power generation	GWh	42 163	45 371	42 631	42 419	44 715
Total system heat generation	MWh	15 042 809	17 460 184	17 459 279	19 546 297	17 455 000
Total CO2 emissions of power generation	kt/a	20 660,63	24 261,98	21 124,84	23 542,86	27 713,73
Total CO2 emissions of energy transformation	kt/a	25 531,01	30 141,32	27 342,33	30 213,27	33 915,19
Baseline Emission Factor - BEF						
1.) Simple _OM_EF	ton/MWh	1,211	1,285	1,212	1,223	1,228
2.) Simple Adjustied _OM_EF	ton/MWh	1,158	1,222	1,149	1,159	1,165
3.) Dispatch Data Analysis _OM_EF	ton/MWh	1,321	1,354	1,285	1,286	1,302
4.) Avarage _OM_EF	ton/MWh	1,264	1,308	1,228	1,233	1,246

Table 2. . Projected data for the electricity generation, CO_2 emissions from electricity generation and the emission factors.

Forecast	Unit	2005	2006	2007	2008	2009	2010	2011	2012
Demand									
Total system power generation	GWh	44 286	44 630	42 747	44 035	46 653	47 448	49 357	49 819
Total system heat generation	MWh	17 793 681	17 875 519	18 057 503	18 320 175	18 746 936	19 028 585	19 284 587	19 358 651
Total CO2 emissions of power generation	kt/a	27 007,06	27 362,63	29 921,25	30 552,87	32 054,20	31 966,56	33 127,52	28 090,51
Total CO2 emissions of energy transformation	kt/a	33 254,84	33 678,44	36 312,76	37 034,58	38 567,49	38 647,22	39 502,31	34 493,21
Baseline Emission Factor - BEF									
Fosil Fuels									
1.) Simple _OM_EF	tone/MWh	1,220	1,237	1,237	1,174	1,097	1,013	1,002	0,997
2.) Simple Adjustied _OM_EF	tone/MWh	1,160	1,176	1,173	1,106	1,021	0,946	0,944	0,941
3.) Dispatch Data Analysis _OM_EF	tone/MWh	1,298	1,292	1,274	1,182	1,102	1,035	1,036	1,038
4.) Avarage _OM_EF	tone/MWh	1,241	1,244	1,241	1,167	1,091	1,022	1,027	1,028

Table 3. Calculations to determine the emission factors for one year

Item	Parameter	Fuel	Available Capacity	Thermal Output	Energy Ootput		Gross Heat Rate		Energy Input	
	Power Plant				Electricity	Heat	Electricity	Heat	Electricity	Total
			Mwel	MWth	GWtlh	MWthh	kJ/Wh	MJ/MWh	GJ/a	GJ/a
	Operating Margin Power Plants									
1	TPP Bobov dol	brown coal	408	1 262	1 699	0	11 068,00	0,00	18 804 532,00	18 804 532,00
2	TPP Varna	antracite	1 018	2 360	4 890	0	10 479,90	0,00	51 242 310,00	51 242 310,00
3	TPP Rousse East (Unit 4)	antracite	100	284	342	0	10 550,00	0,00	3 608 100,00	3 608 100,00
4	TPP Maritsa 3	lignite	95	290	206	0	12 725,35	0,00	2 621 422,10	2 621 422,10
	Total		1 621		7 137				76 276 364,10	76 276 364,10
	Build Margin Power Plants									
	Most Resent Power units									
5	NPP Kozloduy	nuclear	0		0	0	0,00	0,00	0,00	0,00
6	PSHPP Chaira	hydro	630		111	0	0,00	0,00	0,00	0,00
7	DHP Sofia East	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00
8	TPP Maritsa East 2 (Units 7-8 200 MW	lignite	0	0	0	0	10 742,00	0,00	0,00	0,00
	Total Fossil fuels		0		0				0,00	0,00
	Total included hydro and excluded nuclear		630		111					
	Future Build Margin Power Plants									
9	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00
10	HPP Tsankov kamuk	hydro	85		225	0	0,00	0,00	0,00	0,00
11	GTCC	natural gas	200	900	955	826 240	6 008,00	3 500,00	5 737 640,00	8 629 480,00
12	GTCC in DHS Sofia	natural gas	100	450	441	862 520	7 326,90	3 800,00	3 231 162,90	6 508 738,90
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	3 280	0	9 410,00	0,00	30 864 800,00	30 864 800,00
14	TPP Rousse East (unit 3)	antracite	100	284	437	0	10 550,00	0,00	4 610 350,00	4 610 350,00
	Total Fossil fuels		1 050		5 113				44 443 952,90	50 613 368,90
	Total included hydro and excluded nuclear		1 135		5 338				44 443 952,90	50 613 368,90

	Last cost Power Plants									
15	NPP Kozloduy	nuclear	1 900		12 349	0	0,00	0,00	0,00	0,00
16	TPP Maritsa East 2 (Units 1-4 150 MW)	lignite	676	2 334	4 789	0	10 610,00	0,00	50 811 290,00	50 811 290,00
17	TPP Maritsa East 2 (Units 5-8 200 MW)	lignite	818	2 556	5 249	0	10 145,00	0,00	53 251 105,00	53 251 105,00
18	TPP Maritsa East 3	lignite	856	2 675	5 879	0	9 660,00	0,00	56 791 140,00	56 791 140,00
	Total Fossil fuels		4 250		15 917				160 853 535,00	160 853 535,00
	Total excluded nuclear		4 250		15 917				160 853 535,00	160 853 535,00
	"Must Run" Power Plants									
19	Hydro Power plants	hydro	1 800		2 389	0	0,00	0,00	0,00	0,00
20	TPP Brikel	lignite	180	865	950	1 571 578	10 509,00	5 950,00	9 983 550,00	19 334 440,80
21	TPP Rousse East (cogeneration part)	antracite	60	785	183	425 395	11 444,00	4 209,00	2 094 252,00	3 884 741,31
22	Industrial TPP Lukoil	havy oil	257	2 040	1 048	2 482 781	9 108,80	4 284,77	9 547 725,83	20 185 871,58
23	Industrial TPP Deven	antracite	219	1 425	433	3 174 667	7 364,00	4 606,00	3 191 275,17	17 813 789,83
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	454	1 581 599	9 260,00	5 645,00	4 201 282,44	13 129 410,08
25	Industrial TPP Sviloza	antracite	120	660	581	449 695	12 521,70	4 314,70	7 278 130,80	9 218 429,47
26	Industrial TPP Vidahiml	antracite	50	471	285	2 013 743	14 054,11	4 287,99	3 999 592,98	12 634 501,83
27	Industrial TPP Himenergol	natural gas	50	324	111	450 000	8 003,90	3 396,75	889 410,45	2 417 947,95
28	Industrial TPP Nova Plama	natural gas	60	468	40	200 000	10 783,73	3 924,14	428 128,19	1 212 956,19
29	DHP Sofia East	natural gas	186	2 014	526	2 668 214	6 781,78	3 886,19	3 567 216,28	13 936 402,57
30	DHP Sofia	natural gas	50	1 622	178	1 298 867	7 323,97	4 015,14	1 303 666,66	6 518 799,51
31	DHP Pleven	natural gas	24	661	69	417 920	7 062,83	4 341,92	485 252,51	2 299 825,83
32	DHP Plovdiv North	natural gas	85	628	218	866 217	6 857,97	3 830,50	1 497 709,95	4 815 752,75
33	DHP Republika	lignite	105	502	498	1 873 944	15 047,00	4 877,00	7 487 045,04	16 626 268,86
34	DHP Sliven	subbit. Coal	30	220	165	764 521	12 918,79	5 462,93	2 125 859,46	6 302 385,28
35	DHP Shoumen	natural gas	18	175	8	122 196	5 275,37	4 232,02	40 581,61	557 716,81
36	DHP Gabrovo	subbit. Coal	18	196	19	86 524	6 592,00	6 100,00	125 531,67	653 328,96
37	DHP Kazanluk	havy oil	12	114	3	33 733	5 290,00	4 090,00	17 391,02	155 359,85
	Total Fossil fuels		1 636		5 768	22 170 354			58 263 602,05	151 697 929,47
	Total icluded hydro		3 436		8 157				58 263 602,05	151 697 929,47
	System Total		13 922		49 009				339 837 454,00	439 441 197,00

						HPP included				
	Least cost and Must-Run Plants		7 786		21 685	34 034			219 117 137,05	312 551 464,47
	HPP included		9 586		24 074	36 423			219 117 137,05	312 551 464,47
	Average Operating Margin EF				28 822				295 393 501,15	388 827 828,57
	HPP included				31 211				295 393 501,15	388 827 828,57
	Simple Operating Margin_EF				7 137				76 276 364,10	76 276 364,10
		year hours	hours	Lambda (λ)						
	Operating at the margin	8 760	1 860	0,212						
	HPP included		3 283	0,375						
	Simple Adjusted_OM_EF			1,036	109,28					
	HPP included			0,972						
	Dispatch Data Analysis_OM_EF	time	%							
	Operational Margin_EF	1 860	14,563	6 900	7 137				76 276 364,10	76 276 364,10
	HPP included	3 283	19,437	5 477	9 526				76 276 364,10	76 276 364,10
	Least Cost power plants_OM_EF				15 917				160 853 535,00	160 853 535,00
	Dispatch Data Analysis_OM_EF			1,22	119,05					
	HPP included			1,09	95,79					
	Build Margin Emission Factor		1 050		5 113				44 443 952,90	50 613 368,90
	HPP included		1 765		5 449				44 443 952,90	50 613 368,90
	Baseline Emission Factor - BEF		Fossil Fuels	HPP icluded						
	1.) Simple_OM_EF		1,017	0,989	102,019					
	2.) Simple Adjasted_OM_EF		0,950	0,889	101,903					
	3.) Dispatch data Analysis_OM_EF		1,040	0,948	102,019					
	4.) Avarage_OM_EF		1,027	0,946	102,599					

Table 4. Calculations to determine the emission factors for one year (continuation, columns to the left to the above table)

Item	Parameter	Fuel	Net Caorific Value	Fuel Carbon	Carbon Emission	Fraction of Carbon	Actual Carbon Emission		CO2 Emission	
	Power Plant		GJ/Mg	Content	Factor	Unoxidized	Electricity	Total	Electricity	Tota
			MJ/Nm3	%	kgC/GJ	%	kt/a	kt/a	kt/a	kt/a
	Operating Margin Power Plants									
1	TPP Bobov dol	brown coal	9,58	28,72	29,98	1,93	552,86	552,86	2 027,16	027
2	TPP Varna	antracite	24,1	66,00	27,39	4,30	1 342,97	1 342,97	4 924,24	924
3	TPP Rousse East (Unit 4)	antracite	25,43	63,81	25,09	1,87	88,84	88,84	325,76	325
4	TPP Maritsa 3	lignite	7,841	21,6	27,55	2,99	70,05	70,05	256,87	256
	Total								7 534,03	534
	Build Margin Power Plants									
	Most Resent Power units									
5	NPP Kozloduy	nuclear	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0
6	PSHPP Chaira	hydro	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0
7	DHP Sofia East	natural gas	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0
8	TPP Maritsa East 2 (Units 7-8 200 MW	lignite	6,40	18,89	29,50	2,69	0,00	0,00	0,00	0
	Total Fossil fuels								0,00	0
	Total included hydro and excluded nuclear								0,00	0
	Future Build Margin Power Plants									
9	NPP Belene	nuclear	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0
10	HPP Tsankov kamuk	hydro	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0
11	GTCC	natural gas	33,3	50,00	15,02	0,50	85,72	128,92	314,31	472
12	GTCC in DHS Sofia	natural gas	33,3	50,00	15,02	0,50	48,27	97,24	177,00	356
13	TPP Maritsa East 1 (replacing capacity)	lignite	6,489	18,40	28,36	2,00	857,69	857,69	3 144,86	144
14	TPP Rousse East (unit 3)	antracite	25,81	65,90	25,53	2,20	115,13	115,13	422,13	422
	Total Fossil fuels								4 058,29	398
	Total included hydro and excluded nuclear								4 058,29	398

	Last cost Power Plants									
15	NPP Kozloduy	nuclear	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
16	TPP Maritsa East 2 (Units 1-4 150 MW)	lignite	6,40	18,89	29,50	2,58	1 460,35	1 460,35	5 354,61	5 354,61
17	TPP Maritsa East 2 (Units 5-8 200 MW)	lignite	6,40	18,89	29,50	2,46	1 532,36	1 532,36	5 618,64	5 618,64
18	TPP Maritsa East 3	lignite	6,664	19,82	29,74	2,41	1 648,37	1 648,37	6 044,02	6 044,02
	Total Fossil fuels								17 017,28	17 017,28
	Total excluded nuclear								17 017,28	17 017,28
	"Must Run" Power Plants									
19	Hydro Power plants	hydro	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
20	TPP Brikel	lignite	10,597	20,30	19,16	1,90	187,61	363,91	1 332,23	20,10
21	TPP Rousse East (cogeneration part)	antracite	24,97	63,81	25,55	1,73	52,59	97,56	192,84	357,70
22	Industrial TPP Lukoil	havy oil	40,4	85,00	21,04	1,00	198,87	420,46	729,20	1 541,67
23	Industrial TPP Deven	antracite	26,13	66,00	25,26	4,00	77,38	431,95	283,73	1 583,81
24	Industrial TPP Kremikovtsi	blast gas	4,089	12,00	29,49	0,50	123,28	385,27	452,03	1 412,65
25	Industrial TPP Sviloza	antracite	25,14	67,15	26,71	1,20	192,07	143,27	704,25	892,00
26	Industrial TPP Vidahiml	antracite	22,21	61,00	27,47	3,40	106,11	335,21	389,09	1 229,10
27	Industrial TPP Himenergol	natural gas	33,36	50,00	14,99	0,50	13,26	36,06	48,63	132,22
28	Industrial TPP Nova Plama	natural gas	34,08	50,00	14,67	0,50	6,25	17,71	22,92	64,92
29	DHP Sofia East	natural gas	33,36	50,00	14,99	0,50	53,20	207,83	195,06	762,06
30	DHP Sofia	natural gas	33,47	50,00	14,94	0,50	19,38	96,90	71,05	355,28
31	DHP Pleven	natural gas	33,47	50,00	14,94	0,50	7,21	34,19	26,45	125,36
32	DHP Plovdiv North	natural gas	33,45	50,00	14,95	0,50	22,28	71,62	81,68	262,62
33	DHP Republika	lignite	8,02	23,00	28,68	3,88	206,38	458,31	756,74	1 680,48
34	DHP Sliven	subbit. Coal	15,25	30,70	20,13	2,73	41,63	123,41	152,63	452,51
35	DHP Shoumen	natural gas	33,53	50,00	14,91	0,50	0,60	8,28	2,21	30,34
36	DHP Gabrovo	subbit. Coal	26,50	63,00	23,77	8,40	2,73	14,23	10,02	52,17
37	DHP Kazanluk	havy oil	38,90	85,10	21,88	1,00	0,38	3,36	1,38	12,34
	Total Fossil fuels								4 808,00	12 279,00
	Total icluded hydro								4 807,83	12 279,48
	System Total								33 417,43	41 227,03

Least cost and Must-Run Plants								21 825,11	29 296,75
HPP included								21 825,11	29 296,75
Average Operating Margin EF								29 359,14	36 830,78
HPP included								29 359,14	36 830,78
Simple Operating Margin_EF								7 534,02563	7 534,0256
	year hours								
Operating at the margin	8 760								
HPP included									
Simple Adjusted_OM_EF									
HPP included									
Dispatch Data Analysis_OM_EF	time								
Operational Margin_EF	1 860							7 534,03	7 534,03
HPP included	3 283							7 534,03	7 534,03

	Least Cost power plants_OM_EF								17 017,28	17 017,28	
	Dispatch Data Analysis_OM_EF										
	HPP included										
	Build Margin Emission Factor								4 058,29	4 396,25	
	HPP included								4 058,29	4 396,25	
	Baseline Emission Factor - BEF										
	1.) Simple_OM_EF										
	2.) Simple Adjasted_OM_EF										
	3.) Dispatch data Analysis_OM_EF										
	4.) Avarage_OM_EF										

Annex 6

STAKEHOLDERS CONSULTATIONS

On the next pages workshop announcements and the agenda are presented.

ANNEX 6-A

Articles and announcements about the second BEERECL Workshop – 24.09.2004

Web site dir.bg

www.news.dir.bg

Икономика

10 млн. евро безвъзмездно дава ЕБВР за енергийна ефективност

10 милиона евро безвъзмездно ще даде Европейската банка за възстановяване и развитие (ЕБВР) по проекти за енергийна ефективност и използване на възобновяеми енергийни източници.

25 септември 2004, събота, 00:00
Източник: СЕГА

10 милиона евро безвъзмездно ще даде Европейската банка за възстановяване и развитие (ЕБВР) по проекти за енергийна ефективност и използване на възобновяеми енергийни източници. Това стана ясно вчера на започналия край Варна семинар по темата. С тези средства ще оперират”HVB Biochim”и Банка ДСК.ЕБВР вече отпусна кредитна линия от 50 млн. евро на няколко банки за финансиране на проекти за енергийна ефективност и възобновяеми енергийни източници - вятърни, водни или слънчеви централи и мощности, използващи геотермална енергия или биогаз.Стойността на проектите, които са финансирани до момента, е 3,5 млн.евро. Ако те бъдат изпълнени успешно, получателите на кредитите ще имат право да получат от ЕБВР и безвъзмездна помощ до 490 000 евро.
[още]

www.banks.dir.bg

Новини

ЕБВР отпуска 50 милиона евро кредитна линия за енергийна ефективност

24 Септември 2004, Петък, 15:57
Източник : Радио България

50 милиона евро отпуска Европейската банка за възстановяване и развитие /ЕБВР/ чрез кредитна линия за проекти за енергийна ефективност и използване на възобновяеми източници на енергия". Това съобщи днес в курорта "Св.Св. Константин и Елена", край Варна Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Той участва във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност, който беше открит днес край Варна.
На форума има и представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти. 50-те милиона евро ще бъдат разпределени между - Пощенска банка, ОББ, Юнионбанк, Булбанк, HVB Bank Biochim и Банка ДСК. Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ. Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина. Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници. По време на семинара ще бъде представена Националната ни програма за енергийна ефективност, както и самата кредитна линия на ЕБВР.

Още новини »

Newspaper Dnevnik online edition
www.dnevnik.bg

ДНЕВНИК online
Европейски перспективи

Вторник, 28 септември, 2004

ЕБВР отпуска 50 милиона евро за енергийни проекти
DNEVNIK.BG 24/9 - 15:49 ч.

50 милиона евро отпуска Европейската банка за възстановяване и развитие /ЕБВР/ чрез кредитна линия за проекти за енергийна ефективност и използване на възобновяеми източници на енергия". Това съобщи в петък в курорта "Св.Св. Константин и Елена" Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Той участва във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност, който беше открит край Варна. На форума има и представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти.

50-те милиона евро ще бъдат разпределени между - Пощенска банка, ОББ, Юнионбанк, Булбанк, HVB Bank Biochim и Банка ДСК.

Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ. В момента се изпълняват няколко проекта за енергийна ефективност и използване на възобновяеми източници. Отпуснатата досега сума е 3,5 милиона евро. Ван де Вен подчерта, че това са кредити, а не субсидии от банката. Става въпрос за проект за водно-електрически централи и проект за геотермална инсталация. При успешно изпълнение кредитоискателите ще получат от ЕБВР безвъзмездни помощи с общ размер 490 000 евро от Международния фонд "Козлодуй". Фондът е създаден, за да компенсира затварянето на част от блоковете на АЕЦ "Козлодуй".

Компенсацията става по два начина - чрез подобряване на енергийната ефективност, или чрез използване на нови източници, обясни Ван де Вен. Според него използването на възобновяемите източници е по-сполучлив подход. За да кандидатстват за пари фирмите трябва да представят реални проекти и бизнес-план. Фондът на банката подпомага успешно реализираните проекти чрез безвъзмездна помощ в размер на 7,5 процента за проекти за енергийна ефективност и 20 процента за проектите за възобновяеми източници.

Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина.

Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници.
По време на семинара ще бъде представена Националната програма за енергийна ефективност, както и самата кредитна линия на ЕБВР.

Bulgarian Economic portal
www.econ.bg

17:19, 24.09.2004

Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ

50 милиона евро отпуска Европейската банка за възстановяване и развитие /ЕБВР/ чрез кредитна линия за проекти за енергийна ефективност и използване на възобновяеми източници на енергия". Това съобщи днес в курорта "Св.Св. Константин и Елена", край Варна Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Той участва във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност, който беше открит днес край Варна.

На форума има и представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти. 50-те милиона евро ще бъдат разпределени между - Пощенска банка, ОББ, Юнионбанк, Булбанк, HVB Bank Biochim и Банка ДСК. Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ.

Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина. Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници. По време на семинара ще бъде представена Националната ни програма за енергийна ефективност, както и самата кредитна линия на ЕБВР./БНР

ECON.BG

Bulgarian National Radio
Radio Varna
www.radiovarna.com

50 млн евро предоставя Европеската банка за възстановяване и развитие на шест български банки

Радио Варна 24.09.2004 13:53

50 млн евро предоставя Европеската банка за възстановяване и развитие на шест български банки чрез кредитната си линия за енергийна ефективност и възобновяеми енергийни източници, съобщи представителят на банката Ян Вилен Вандевен. Обявените нови четири заема, финасирани по тази линия са с общ размер от 3 млн. и 73 хил. евро и са предоставени от ОББ. Те са за изпълнение на проекта за енергийна ефективност, за два проекта за малки ВЕЦ и проект за геотермална инсталация. В допълнение към преките икономически ползи се очаква проектите да осигурят намаляване на емисиите на въглероден двуокис в размер на 224 хил. тона за периода 2005-12 година . Допълнително ЕБВР предоставя 10 млн евро под формата на гранд или безвъзмездна помощ за извеждане от експолатация на реакторите на АЕЦ Козлодуй и за компенсиране на загубите на енергия в следствие затваряне на блоковете

Electronic newspaper Varnapool
www.varnapool.net

24 09 2004

ЕБВР отпуска 50 млн. евро кредитна линия за енергийна ефективност
Източник: varnapool.net

Европейската банка за възстановяване и развитие /ЕБВР/ финансира чрез кредитна линия от 50 млн. евро проекти за енергийна ефективност и използване на възобновяеми източници на енергия, съобщи днес в курорта "Св. Константин" Ян-Вилем ван де Вен от банката. Той е във Варна за участие във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност. В него участват представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти.

50-те млн. евро ще бъдат разпределени между шестте банки – БПБ, ОББ, Юнионбанк, Булбанк, HVB-Биохим и банка ДСК. Допълнително ЕБВР предоставя 10 млн. евро под формата на безвъзмездна помощ, обясни представителят на банката. Най-голямата част от кредитната линия – 15 млн. евро, ще се осъществява от ОББ.

В момента се изпълняват няколко проекта за енергийна ефективност и използване на възобновяеми източници, като отпуснатата сума до момента е 3.5 млн. евро. Ван де Вен подчерта, че това са кредити, а не субсидии от банката. Сред изпълняваните проекти са два за водно-електрически централи и проект за геотермална инсталация. При успешно изпълнение кредитоискателите ще получат от ЕБВР безвъзмездни помощи с общ размер 490 000 евро от Международния фонд «Козлодуй».

Фондът е създаден, за да компенсира затварянето на част от блоковете на АЕЦ, а компенсацията става по два начина - или чрез подобряване на енергийната ефективност, или чрез използване на нови източници, обясни Ван де Вен. Според него използването на възобновяемите източници се явява удачен подход.

За да кандидатстват за заем, фирмите трябава да представят реални проекти и бизнес-план, обясни представителят на ЕБВР. Кредитите се отпускат на изпълнителите на проектите. Фондът на банката подпомага успешно реализираните проекти чрез безвъзмездна помощ в размер на 7.5 процента за проекти за енергийна ефективност и 20 процента за проектите за възобновяеми източници.

Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина.

Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници.

По време на семинара ще бъде представена Националната програма за енергийна ефективност, както и самата кредитна линия на ЕБВР. В проявата освен представители на банките участват зам.председателят на Държавната комисия за енергийно регулиране Игнат Томанов и Кольо Колев, който е директор по енергийна ефективност и възобновяеми енергийни източници в Агенцията за енергийна ефективност.

Bulgarian National Radio Chain Darik Radio
www.darik.net

Бизнес

[<<] [6 от 41] [>>]

ЕБВР - кредитна линия за енергийна ефективност
24-09-2004 18:14

50 милиона евро за проекти
Кредитна линия от 50 милиона евро за проекти за енергийна ефективност и използване на възобновяеми източници на енергия отпуска на страната ни ЕБВР. Това съобщи днес в курорта Свети Константин край Варна Ян-Вилем ван де Вен от банката. Той е в морския град за участие във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност.

Коментирай Николай Христов

Bulgarian National Radio
Radio Bulgaria
www.bnr.bg

Новини

Публикувано на 24 Септември 2004 в 15:57 BG

Евробанката за възстановяване и развитие отпуска 50 милиона евро кредитна линия за енергийна ефективност
50 милиона евро отпуска Европейската банка за възстановяване и развитие /ЕБВР/ чрез кредитна линия за проекти за енергийна ефективност и използване на възобновяеми източници на енергия". Това съобщи днес в курорта "Св.Св. Константин и Елена", край Варна Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Той участва във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност, който беше открит днес край Варна. На форума има и представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти. 50-те милиона евро ще бъдат разпределени между - Пощенска банка, ОББ, Юнионбанк, Булбанк, HVB Bank Biochim и Банка ДСК. Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ. Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина. Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници. По време на семинара ще бъде представена Националната ни програма за енергийна ефективност, както и самата кредитна линия на ЕБВР.

Web site dnes +
www.dnesplus.com

50 млн. евро предоставя Европейката банка за възстановяване и развитие на шест български банки

24/9/2004 15:56

50 млн. евро предоставя Европейката банка за възстановяване и развитие на шест български банки чрез кредитната си линия за енергийна ефективност и възобновяеми енергийни източници, съобщи представителят на банката Ян Вилен Вандевен.

Обявените нови четири заема, финансирани по тази линия са с общ размер от 3 млн. и 73 хил. евро и са предоставени от ОББ. Те са за изпълнение на проекта за енергийна ефективност, за два проекта за малки ВЕЦ и проект за геотермална инсталация. В допълнение към преките икономически ползи се очаква проектите да осигурят намаляване на емисиите на въглероден двуокис в размер на 224 хил. тона за периода 2005-12 година .

Допълнително ЕБВР предоставя 10 млн. евро под формата на гранд или безвъзмездна помощ за извеждане от експлоатация на реакторите на АЕЦ Козлодуй и за компенсиране на загубите на енергия в следствие затваряне на блоковете. Информацията е на Радио Варна.

Bulgarian telegraphic agency – BTA
www.bta.bg

Варна - ЕБВР - кредитиране

ЕБВР отпуска 50 милиона евро кредитна линия за енергийна ефективност
Варна, 24 септември /БТА/

50 милиона евро отпуска Европейската банка за възстановяване и развитие /ЕБВР/ чрез кредитна линия за проекти за енергийна ефективност и използване на възобновяеми източници на енергия". Това съобщи днес в курорта "Св.Св. Константин и Елена" Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката.

Той участва във втория семинар за използване на възобновяеми източници на енергия и енергийна ефективност, който беше открит днес край Варна. На форума има и представители на шестте банки в страната, чрез които ще се осъществява кредитирането на фирмите, кандидатстващи с проекти.
50-те милиона евро ще бъдат разпределени между - Пощенска банка, ОББ, Юнионбанк, Булбанк, HVB Bank Biochim и Банка ДСК. Допълнително ЕБВР предоставя 10 милиона евро под формата на безвъзмездна помощ.

В момента се изпълняват няколко проекта за енергийна ефективност и използване на възобновяеми източници. Отпуснатата досега сума е 3,5 милиона евро. Ван де Вен подчерта, че това са кредити, а не субсидии от банката.
Става въпрос за проект за водно-електрически централи и проект за геотермална инсталация. При успешно изпълнение кредитоискателите ще получат от ЕБВР безвъзмездни помощи с общ размер 490 000 евро от Международния фонд "Козлодуй".
Фондът е създаден, за да компенсира затварянето на част от блоковете на АЕЦ "Козлодуй". Компенсацията става по два начина - чрез подобряване на енергийната ефективност, или чрез използване на нови източници, обясни Ван де Вен. Според него използването на възобновяемите източници е по- сполучлив подход.

За да кандидатстват за пари фирмите трябва да представят реални проекти и бизнес-план. Фондът на банката подпомага успешно реализираните проекти чрез безвъзмездна помощ в размер на 7,5 процента за проекти за енергийна ефективност и 20 процента за проектите за възобновяеми източници.

Проектите за енергийна ефективност могат да включват малки мощности за комбинирано производство на топло и електроенергия, проекти за реконструкция на енергийна инфраструктура, за оползотворяване на отпадна топлина.
Изграждане на малки водноелектрически централи, слънчеви инсталации, вятърни централи, геотермални инсталации и инсталации с биогаз са сред проектите от частта за използването на възобновяеми енергийни източници.
По време на семинара ще бъде представена Националната програма за енергийна ефективност, както и самата кредитна линия на ЕБВР. /ДР/

/СВ/

Newspaper Sega – electronic edition
www.segabg.com

Икономика

24.09.2004 г.

10 млн. евро безвъзмездно дава ЕБВР за енергийна ефективност

НАТАЛИЯ ВУЧКОВА

10 милиона евро безвъзмездно ще даде Европейската банка за възстановяване и развитие (ЕБВР) по проекти за енергийна ефективност и използване на възобновяеми енергийни източници. Това стана ясно вчера на започналия край Варна семинар по темата. С тези средства ще оперират "HVB Biochim" и Банка ДСК.
ЕБВР вече отпусна кредитна линия от 50 млн. евро на няколко банки за финансиране на проекти за енергийна ефективност и възобновяеми енергийни източници - вятърни, водни или слънчеви централи и мощности, използващи геотермална енергия или биогаз.
Стойността на проектите, които са финансирани до момента, е 3,5 млн. евро. Ако те бъдат изпълнени успешно, получателите на кредитите ще имат право да получат от ЕБВР и безвъзмездна помощ до 490 000 евро. Парите ще дойдат от Международния фонд "Козлодуй", който се управлява от ЕБВР, каза във Варна Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Фондът бе създаден за усвояване на средствата, които Евросъюзът отпусна за предсрочното затваряне на реактори в АЕЦ "Козлодуй".
При действащи проекти за енергийна ефективност фондът отпуска помощ в размер на 7,5% от стойността им, а за възобновяемите източници този процент достига 20.

Newspaper Sega, daily
Print media

ЕБВР безвъзмездно кредитира енергийни проекти

НАТАЛИЯ ВУЧКОВА

10 милиона евро безвъзмездно ще даде Европейската банка за възстановяване и развитие (ЕБВР) по проекти за енергийна ефективност и използване на възобновяеми енергийни източници. Това стана ясно вчера на започналия край Варна семинар по темата. С тези средства ще оперират „HVB Biochim" и Банка ДСК.

ЕБВР вече отпусна кредитна линия от 50 млн. евро на няколко банки за финансиране на проекти за енергийна ефективност и възобновяеми енергийни източници – вятърни, водни или слънчеви централи и мощности, използващи геотермална енергия или биогаз.

Стойността на проектите, които са финансирани до момента, е 3,5 млн. евро. Ако те бъдат изпълнени успешно, получателите на кредитите ще имат право да получат от ЕБВР и безвъзмездна помощ до 490 000 евро. Парите ще дойдат от Международния фонд „Козлодуй", който се управлява от ЕБВР, каза във Варна Ян-Вилем ван де Вен от дирекцията за енергийна ефективност на банката. Фондът бе създаден за усвояване на средствата, които Евросъюзът отпусна за предсрочното затваряне на реактори в АЕЦ „Козлодуй".

При действащи проекти за енергийна ефективност фондът отпуска помощ в размер на 7,5% от стойността им, а за възобновяемите източници този процент достига 20.

ANNEX 6-B

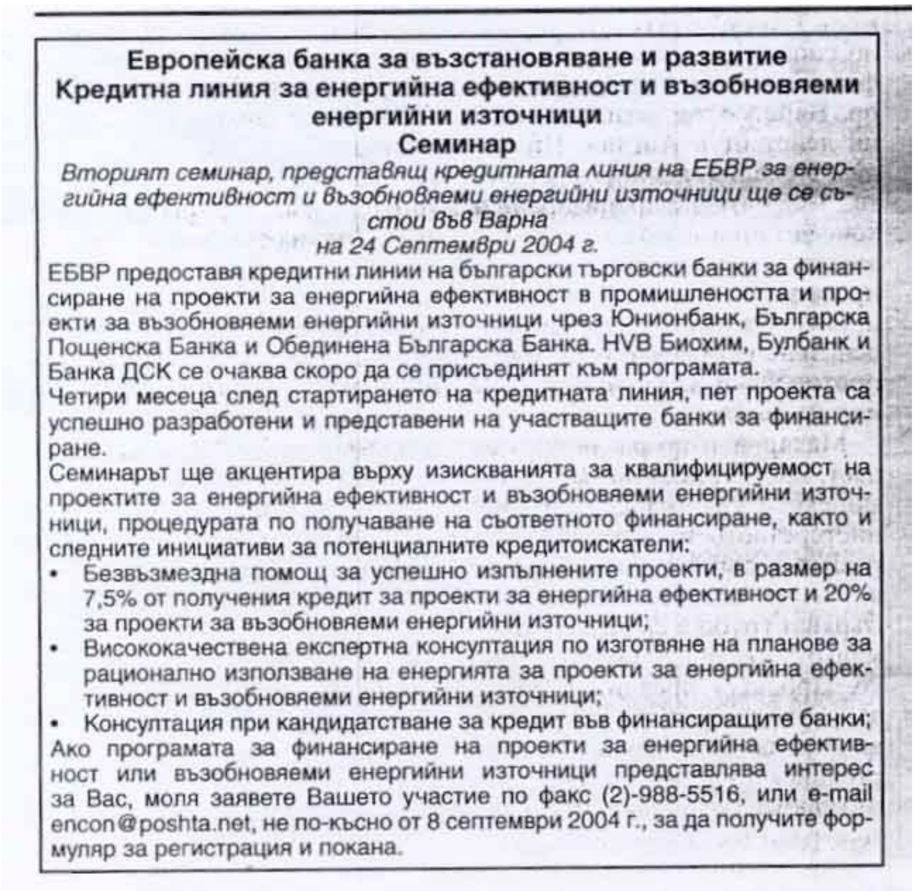
WORKSHOP ADVERTISEMENT

Advertisements for the second BEERECL Workshop

Advertisements for the second BEERECL workshop were published in the following newspapers:

- The weekly newspaper Capital. Published in issue No. 35 of the newspaper, dated September 4, 2004, Saturday.
- The daily newspaper Pari. Published in issue No. 168, dated September 1, 2004 – Wednesday.
- The daily newspaper 24 Hours Varna. The advertisement is published in issue No.174, dated September 2, 2004 – Thursday
- The daily newspaper Sea Trud Varna. Published in issue No.172 of the newspaper, dated September 2, 2004, Thursday.
- The daily newspaper 24 Hours Bourgas. The advertisement is published in issue No.174, dated September 2, 2004, Thursday
- The daily newspaper Sea Trud Bourgas. Published in issue No.174 of the newspaper, dated September 2, 2004, Thursday

Advertisement in the Newspaper Capital



Европейска банка за възстановяване и развитие
Кредитна линия за енергийна ефективност и възобновяеми енергийни източници
Семинар

Вторият семинар, представящ кредитната линия на ЕБВР за енергийна ефективност и възобновяеми енергийни източници ще се състои във Варна на 24 Септември 2004 г.

ЕБВР предоставя кредитни линии на български търговски банки за финансиране на проекти за енергийна ефективност в промишлеността и проекти за възобновяеми енергийни източници чрез Юнионбанк, Българска Пощенска Банка и Обединена Българска Банка. HVB Биохим, Булбанк и Банка ДСК се очаква скоро да се присъединят към програмата.

Четири месеца след стартирането на кредитната линия, пет проекта са успешно разработени и представени на участващите банки за финансиране.

Семинарът ще акцентира върху изискванията за квалифицируемост на проектите за енергийна ефективност и възобновяеми енергийни източници, процедурата по получаване на съответното финансиране, както и следните инициативи за потенциалните кредитоискатели:

- Безвъзмездна помощ за успешно изпълнените проекти, в размер на 7,5% от получения кредит за проекти за енергийна ефективност и 20% за проекти за възобновяеми енергийни източници;
- Висококачествена експертна консултация по изготвяне на планове за рационално използване на енергията за проекти за енергийна ефективност и възобновяеми енергийни източници;
- Консултация при кандидатстване за кредит във финансиращите банки;

Ако програмата за финансиране на проекти за енергийна ефективност или възобновяеми енергийни източници представлява интерес за Вас, моля заявете Вашето участие по факс (2)-988-5516, или e-mail encon@poshta.net, не по-късно от 8 септември 2004 г., за да получите формуляр за регистрация и покана.

Advertisement in the Newspaper Pari

Европейска банка за възстановяване и развитие
Кредитна линия за енергийна ефективност и възобновяеми енергийни източници
Семинар

Вторият семинар, представящ кредитната линия на ЕБВР за енергийна ефективност и възобновяеми енергийни източници ще се състои във Варна на 24 Септември 2004 г.

ЕБВР предоставя кредитни линии на български търговски банки за финансиране на проекти за енергийна ефективност в промишлеността и проекти за възобновяеми енергийни източници чрез Юнионбанк, Българска Пощенска Банка и Обединена Българска Банка. HVB Биохим, Булбанк и Банка ДСК се очаква скоро да се присъединят към програмата.

Четири месеца след стартирането на кредитната линия, пет проекта са успешно разработени и представени на участващите банки за финансиране.

Семинарът ще акцентира върху изискванията за квалифицируемост на проектите за енергийна ефективност и възобновяеми енергийни източници, процедурата по получаване на съответното финансиране.

- Безвъзмездна помощ за успешно изпълнените проекти, в размер на 7,5% от получения кредит за проекти за енергийна ефективност и 20% за проекти за възобновяеми енергийни източници;
- Висококачествена експертна консултация по изготвяне на планове за рационално използване на енергията за проекти за енергийна ефективност и възобновяеми енергийни източници;
- Консултация при кандидатстване за кредит във финансиращите банки;

Ако програмата за финансиране на проекти за енергийна ефективност или възобновяеми енергийни източници представлява интерес за Вас, моля заявете Вашето участие по факс (2)-988-5516, или e-mail encon@poshta.net, не по-късно от 8 септември 2004 г., за да получите формуляр за регистрация и покана.

Advertisement in Newspapers 24 Hours and Sea Trud Varna

Европейска банка за възстановяване и развитие
Кредитна линия за енергийна ефективност и възобновяеми енергийни източници
Семинар

Вторият семинар, представящ кредитната линия на ЕБВР за енергийна ефективност и възобновяеми енергийни източници ще се състои във Варна

на 24 Септември 2004 г.

ЕБВР предоставя кредитни линии на български търговски банки за финансиране на проекти за енергийна ефективност в промишлеността и проекти за възобновяеми енергийни източници чрез Юнионбанк, Българска Пощенска Банка и Обединена Българска Банка. HVB Биохим, Булбанк и Банка ДСК се очаква скоро да се присъединят към програмата.

Четири месеца след стартирането на кредитната линия, пет проекта са успешно разработени и представени на участващите банки за финансиране.

Семинарът ще акцентира върху изискванията за квалифицируемост на проектите за енергийна ефективност и възобновяеми енергийни източници, процедурата по получаване на съответното финансиране, както и следните инициативи за потенциалните кредитоискатели:

- Безвъзмездна помощ за успешно изпълнените проекти, в размер на 7,5% от получения кредит за проекти за енергийна ефективност и 20% за проекти за възобновяеми енергийни източници;
- Висококачествена експертна консултация по изготвяне на планове за рационално използване на енергията за проекти за енергийна ефективност и възобновяеми енергийни източници;
- Консултация при кандидатстване за кредит във финансиращите банки;

Ако програмата за финансиране на проекти за енергийна ефективност или възобновяеми енергийни източници представлява интерес за Вас, моля заявете Вашето участие по факс (2)-988-5516, или e-mail encon@poshta.net, не по-късно от 8 септември 2004 г., за да получите формуляр за регистрация и покана.

Advertisement in newspapers 24 Hours and Sea Trud Bourgas

Европейска банка за възстановяване и развитие
Кредитна линия за енергийна ефективност и възобновяеми енергийни източници - Семинар

Вторият семинар, представящ кредитната линия на ЕБВР за енергийна ефективност и възобновяеми енергийни източници ще се състои във Варна на 24 Септември 2004 г.

ЕБВР предоставя кредитни линии на български търговски банки за финансиране на проекти за енергийна ефективност в промишлеността и проекти за възобновяеми енергийни източници чрез Юнионбанк, Българска Пощенска Банка и Обединена Българска Банка. HVB Биохим, Булбанк и Банка ДСК се очаква скоро да се присъединят към програмата.

Четири месеца след стартирането на кредитната линия, пет проекта са успешно разработени и представени на участващите банки за финансиране.

Семинарът ще акцентира върху изискванията за квалифицируемост на проектите за енергийна ефективност и възобновяеми енергийни източници, процедурата по получаване на съответното финансиране, както и следните инициативи за потенциалните кредитоискатели:

- Безвъзмездна помощ за успешно изпълнените проекти, в размер на 7,5% от получения кредит за проекти за енергийна ефективност и 20% за проекти за възобновяеми енергийни източници;
- Висококачествена експертна консултация по изготвяне на планове за рационално използване на енергията за проекти за енергийна ефективност и възобновяеми енергийни източници;
- Консултация при кандидатстване за кредит във финансиращите банки;

Ако програмата за финансиране на проекти за енергийна ефективност или възобновяеми енергийни източници представлява интерес за Вас, моля заявете Вашето участие по факс (2)-988-5516, или e-mail encon@poshta.net, не по-късно от 8 септември 2004 г., за да получите формуляр за регистрация и покана.

Annex 6-C

AGENDA

European Bank for Reconstruction and Development
Bulgaria Energy Efficiency and Renewable Energy Credit Line Workshop

September 24, 2004

International Home of Science "Fr. Joliot-Curie", St. Constantine and Elena resort, Varna, Bulgaria

11:00 to 11:45 Press Conference *(Conference Hall 3, International Home of Science "Fr. Joliot-Curie")*
With the participation of :
Koljo Kolev, Director Energy Efficiency & Renewable Energy, Energy Efficiency Agency
Terry McCallion, Principal Banker, Energy Efficiency, EBRD
Jan-Willem van de Ven, Operation Leader Technical Cooperation, EBRD
Representatives of :Participating Banks
Ignat Tomanov, Deputy Chairman of the State Energy Regulatory Commission
Bannock Consulting and EnCon Services
Independent Energy Expert

11:30 to 12:00 Workshop Registration *(Conference Hall 5, International Home of Science "Fr. Joliot-Curie")*

12:00 to 12:20 ***Opening***
National Energy Efficiency Program, Energy efficiency and Renewable Energy Projects financing
Koljo Kolev, Director Energy Efficiency & Renewable Energy, Energy Efficiency Agency
Key-note by EBRD
Jan-Willem van de Ven, Operation Leader Technical Cooperation, EBRD

12:20 to 12:40 ***Bulgarian Energy Efficiency and Renewable Energy Credit Line Facility***
Michael Velikanov, Project Manager, the Bannock Consulting and EnCon Services Project Team

12:40 to 13:40 ***Introduction by Participating Banks***
Martin Petrov, Head Project Unit, Postbank
Stefan Vassilev, Manager, SME and International Lending Programs, UBB
Kiril Chaltakov, Coordinator of Lending Division, Unionbank
Anton Kobakov, Project and structured finance, Bulbank
Kiril Hristov, Head of Products for Business Clients, HVB~BankBiochim
Kostadin Karadjov, Head of Sales and Product Management Department, Bank DSK

13:40 to 14:10 Coffee Break

14:10 to 14:30 ***Regulatory support for renewable energy and co-generation***
Ignat Tomanov, Deputy Chairman of the State Energy Regulatory Commission

14:30 to 14:45 ***rational Energy Utilisation Plan***
Renata Natan, Financial Expert, EnCon Services

14:45 to 15:00 ***Energy Audit***
Iliya Iliev, Senior Engineer, EnCon Services

15:00 to 15:30 Questions and Answers Session
Koljo Kolev, Director Energy Efficiency & Renewable Energy, Energy Efficiency Agency
Jan-Willem van de Ven, Operation Leader Technical Cooperation, EBRD
Representatives of the Participating Banks
Ignat Tomanov, Deputy Chairman of the State Energy Regulatory Commission
Bannock Consulting and EnCon Services
Independent Energy Expert

15:30 Refreshments with Booths for the Participating Banks

Annex 7

DETAILED TECHNICAL SPECIFICATIONS AND CHARTS FOR THE MAIN ENERGY EQUIPMENT AND AUXILIARY FACILITY

Refer to main text

Annex 8

CALCULATION SHEETS

Sugar plants

2003 data taken from *Rational Energy Utilisation and Financing Plan for Sugar Plants Energy Efficiency Project, June 20* (Refer to table 3.3 p. 11 of second plan)

Turbine TG1		Steam prod			
Total production	15.416 MWh	47.688 tons	0,3232679	MWh produced per ton steam/y	
Purchased	7.295 MWh		0,264206	ratio of net amount of MWh purchased per MWh own production	
Sold	3.222 MWh				
	19.489				
PK-35-39					
Coal cons	8.047 tons	47.688 tons	16,87%	ratio ton coal per ton steam	
HFO cons	199 tons		0,42%	ratio of ton HFO per ton steam	
ECO1	Start 1 Oct. 2005				
Turbine replacement					
Own supply	17778 MWh		0,3728	MWh produced per ton steam/y	delta = 0,050
Purchased	4933 MWh		0,10	ratio of net amount of MWh purchased per MWh own production	
Sold	3222 MWh		10% losses over purchased and sold		
	19489				
PK-35-39					
Coal cons	6.470 tons	47.688 tons	13,57%	ratio ton coal per ton steam	
HFO cons	0 tons		0,46%	ratio of 1000 Nm3 Gas per ton steam	
Gas cons	217 1000Nm3		3,35%	Ratio Gas to Coal	
+ECO2	Start 1 Oct. 2006				
Own supply	17.778		12,5813%	ratio ton coal per ton steam	
Purchased	4.933		7%	eff gain due to implementing 2 HEs	
Sold	3.222				
Coal cons	6.000 tons	47.688 tons			
HFO cons	0 tons				
Gas cons	217 100Nm3				

Zebra

2003 data are taken from *Rational Energy Utilisation Plan No. 25 Zebra Energy Efficiency Project, May 2005 and during site visits*

ECO1

Baseline (boiler)	**2003**		Baseline ratio
Steam production	30551 t/y		96 Nm3 gas per ton steam /yr
Gas consumption	2937 (000Nm3/y)		27,64% MWh per ton steam/yr
Electricity consumption	8444 MWh		
Gas consumption	98390 (GJ/y)		
Project (CHP)			
Steam production	30551 t/y		
Gas consumption	4474 (000Nm3/y)		Project ratio
El production CHP	9470 MWh		31,00% MWh produced by CHP per ton steam/yr
consumption of CHP	473 MWh		473 electricity losses including CHP needs
Net supply to NEC	553 MWh		
Electricity consumption	8917 MWh	Consumption company after CHP installation	
Project (New water treatment and deaerator)			
Gas red	147 (000Nm3/y)		141,6 Nm3 gas per ton steam /yr
Gas consumption	4327 (000Nm3/y)		0,29096 MWh consumed by CHP per ton steam/yr
Electricity red	28 MWh		
Electricity consumption	8889 MWh	Consumption company	

ECO2

Reduced gas consumption		Project ratio
Gas red	133 (000Nm3/y)	4,35 Nm3 gas saved by ECO2 per ton steam /yr

ECO3 WILL NOT BE INCLUDED

Reduced gas and el consumption due to heat exchangers		Baseline ratio
Gas red	48 (000Nm3/y)	Nm3 per hl hot water/y
El red	193 MWh	MWh per hl hot water/y
Hot water production	unknown	Not possible to calculate, baseline gas & el data and hot water supply data are missing

ECO4, in PDD ECO3

Baseline ratio	0,293 MWh/h operated		efficiency gain
Project ratio	0,22 MWh/h operated		25%
Working hours/yr	2600 hrs		Project ratio if machine operates 2600 hrs/yr
Electricity consumption Cal. Eng.	762 MWh		
Electricity consumption ECO4	572 MWh		
El red	190 MWh		
Electricity consumption	8699 MWh	Consumption company	

Pirinplast

2003 data are taken from *Rational Energy Utilisation Plan No. 20 Pirinplast Energy Efficiency Project, March 2005*

Data below from table 2.3, p. 9

Production data	**2002**	**2003**	**2004**
Corrugated materials from PP	8525	8368	10669
Spray products	1072	764	737
Extruded polymer net	221	205	181
Kitchen utensils	453	664	865
Others	328	269	313
TOTAL	10599	10270	12765
Percentage CM form PP of total products	80%	81%	84%

	2002	2003	2004	Average energy cons.
Energy consumption (MWh)	1703	1530	2011	1748

Ratios production / MWh	**2002**	**2003**	**2004**	**3 yrs average**	*Difference (%) per year of average*			*Total deviation of average*
Corrugated materials from PP	5,01	5,47	5,31	5,26	*-5%*	*4%*	*1%*	*10%*
Spray products	0,63	0,50	0,37	0,50	*26%*	*0%*	*-26%*	*53%*
Extruded polymer net	0,13	0,13	0,09	0,12	*10%*	*14%*	*-24%*	*47%*
Kitchen utensils	0,27	0,43	0,43	0,38	*-29%*	*15%*	*14%*	*59%*
Others	0,19	0,18	0,16	0,17	*10%*	*1%*	*-11%*	*22%*
All products	6,22	6,71	6,35	6,43	*-3%*	*4%*	*-1%*	*9%*
Best ratio for energy consumption - production is								
CM from PP + TOTAL / 2	5,61	6,09	5,83	5,84	-4%	4%	0%	8%

Baseline calculation is — Average of: 1) production data of corrugated materials from PP and 2) total production times 5,84

	2002	2003	2004	
Estimated energy consumption (MWh)	1636	1595	2005	**1745**
Delta measured minus estimated	67	-65	6	3

Estimated project emissions are 238 MWh/y

Data from table 3.3. on p. 19

1773

BASELINE:										
Emissions Characteristics	**Unit**	**2005 Q1-Q3**	**2005 Q4**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Steam production	t/y	35.766	11.922	47.688	47.688	47.688	47.688	47.688	47.688	47.688
Electricity Produced	MWh/y	11.562	3.854	15.416	15.416	15.416	15.416	15.416	15.416	15.416
Electricity Purchased from NEC	MWh/y	3.055	1.018	4.073	4.073	4.073	4.073	4.073	4.073	4.073
Heavy oil consumption	t/y	150	50	200	200	200	200	200	200	200
Coal consumption	t/y	6.035	2.012	8.047	8.047	8.047	8.047	8.047	8.047	8.047
CEF for Electricity Consumption	t CO2eq/MWh	1,319	1,319	1,319	1,319	1,319	1,319	1,319	1,319	1,319
CEF Coal	t CO2eq/t	2,43	2,43	2,43	2,43	2,43	2,43	2,43	2,43	2,43
CEF Heavy Oil	t CO2eq/t	3,21	3,21	3,21	3,21	3,21	3,21	3,21	3,21	3,21
CO2eq Electricity	t CO2eq/MWh	4.029	1.343	5.372	5.372	5.372	5.372	5.372	5.372	5.372
CO2eq Coal	t CO2eq/t	14.661	4.887	19.548	19.548	19.548	19.548	19.548	19.548	19.548
CO2eq Heavy oil	t CO2eq/t	482	161	643	643	643	643	643	643	643
Total CO2eq	**t CO2eq/y**	**19.172**	**6.391**	**25.563**	**25.563**	**25.563**	**25.563**	**25.563**	**25.563**	**25.563**
										204.504

PROJECT EMISSIONS:									
Emissions Characteristics	**Unit**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Steam production	t/y	11.922	47.688	47.688	47.688	47.688	47.688	47.688	47.688
Electricity Production	MWh/y	4.445	17.778	17.778	17.778	17.778	17.778	17.778	17.778
Electricity Purchased from NEC	MWh/y	428	1.711	1.711	1.711	1.711	1.711	1.711	1.711
Heavy oil	t/y	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Natural gas	t CO2eq/y	55	219	219	219	219	219	219	219
Natural Gas Consumption	GJ/y	1.837	7.349	7.349	7.349	7.349	7.349	7.349	7.349
Coal consumption	t/y	1.609	6.320	5.968	5.968	5.968	5.968	5.968	5.968
Saved coal due to ECO1	t/y	402	1.609	1.609	1.609	1.609	1.609	1.609	1.609
Saved coal due to ECO2	t/y		118	470	470	470	470	470	470
CEF for Electricity Consumption	t CO2eq/MWh	1,32	1,32	1,32	1,32	1,32	1,32	1,32	1,32
CEF Natural Gas	t CO2eq/GJ	0,06	0,06	0,06	0,06	0,06	0,06	0,06	0,06
CEF Coal	t CO2eq/t	2,43	2,43	2,43	2,43	2,43	2,43	2,43	2,43
CEF Heavy Oil	t CO2eq/t	3,21	3,21	3,21	3,21	3,21	3,21	3,21	3,21
CO2eq Electricity	t CO2eq/MWh	564	2.257	2.257	2.257	2.257	2.257	2.257	2.257
CO2eq Coal	t CO2eq/t	3.910	15.353	14.497	14.497	14.497	14.497	14.497	14.497
CO2eq Natural Gas	t CO2eq/t	103	410	410	410	410	410	410	410
CO2eq Heavy oil	t CO2eq/t	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Total CO2eq	**t CO2eq/y**	**4.576**	**18.020**	**17.163**	**17.163**	**17.163**	**17.163**	**17.163**	**17.163**
									125.577

EMISSION REDUCTIONS:									
Scenario	**Unit**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Baseline	t CO2eq/y	6.391	25.563	25.563	25.563	25.563	25.563	25.563	25.563
Project	t CO2eq/y	4.576	18.020	17.163	17.163	17.163	17.163	17.163	17.163
Total tonnes CO2eq	**t CO2eq/y**	**1.814**	**7.543**	**8.400**	**8.400**	**8.400**	**8.400**	**8.400**	**8.400**
									59.755

BASELINE SCENARIO:										
Emissions Characteristics	**Unit**	**2005**	**2006 Q1-Q3**	**2006 Q4**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Steam production	t/y	30.551	22.913	7.638	30.551	30.551	30.551	30.551	30.551	30.551
Electricity purchased from NEC	MWh/y	8.444	6.333	2.111	8.444	8.444	8.444	8.444	8.444	8.444
Electricity generated by CHP	MWh/y			2.368	9.470	9.470	9.470	9.470	9.470	9.470
Natural Gas Consumption	1000 m3/y	2.933	2.200	733	2.933	2.933	2.933	2.933	2.933	2.933
Natural Gas Consumption	GJ/y	98.252	73.689	24.563	98.252	98.252	98.252	98.252	98.252	98.252
Operating hours Calendar engine	hrs/y	2.600	2.600	650	2.600	2.600	2.600	2.600	2.600	2.600
CEF for Electricity Generation	t CO2eq/MWh	1,199	1,199	1,199	1,199	1,199	1,199	1,199	1,199	1,199
CEF for Electricity Consumption	t CO2eq/MWh	1,319	1,319	1,319	1,319	1,319	1,319	1,319	1,319	1,319
CEF for Natural Gas	t CO2eq/GJ	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558
CO2eq Electricity	t CO2eq/y	11.137	8.353	5.623	22.492	22.492	22.492	22.492	22.492	22.492
CO2eq Natural Gas	t CO2eq/y	5.482	4.112	1.371	5.482	5.482	5.482	5.482	5.482	5.482
Total tonnes CO2eq	**t CO2eq/y**	**16.620**	**12.465**	**6.994**	**27.974**	**27.974**	**27.974**	**27.974**	**27.974**	**27.974**
										187.303

PROJECT EMISSIONS:								
Emissions Characteristics	**Unit**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Steam production	t/y	7.638	30.551	30.551	30.551	30.551	30.551	30.551
Electricity purchased from NEC	MWh/y	2.182	8.727	8.727	8.727	8.727	8.727	8.727
Consumed electricity by CHP	MWh/y	118	473	473	473	473	473	473
Saved electricity due to frequeny controlled engine	MWh/y	47	190	190	190	190	190	190
Natural Gas Consumption	1000 m3/y	1.131	4.474	4.474	4.474	4.474	4.474	4.474
Saved natural gas ECO2	1000 m3/y	33	133	133	133	133	133	133
Natural Gas Consumption	GJ/y	36.765	145.424	145.424	145.424	145.424	145.424	145.424
Operating hours electric engine (ECO 3)	hrs/y	650	2.600	2.600	2.600	2.600	2.600	2.600
CEF for Electricity Consumption	t CO2eq/MWh	1,319	1,319	1,319	1,319	1,319	1,319	1,319
CEF for Natural Gas	t CO2eq/GJ	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558	0,0558
CO2eq Electricity from NEC and losses	t CO2eq/y	2.878	11.511	11.511	11.511	11.511	11.511	11.511
CO2eq Natural Gas	t CO2eq/y	2.052	8.115	8.115	8.115	8.115	8.115	8.115
Total tonnes CO2eq	**t CO2eq/y**	**4.929**	**19.625**	**19.625**	**19.625**	**19.625**	**19.625**	**19.625**
								122.681

EMISSION REDUCTIONS:								
Scenario	**Unit**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Baseline	t CO2eq/y	6.994	27.974	27.974	27.974	27.974	27.974	27.974
Project	t CO2eq/y	4.929	19.625	19.625	19.625	19.625	19.625	19.625
Total tonnes CO2eq	**t CO2eq/y**	**2.064**	**8.349**	**8.349**	**8.349**	**8.349**	**8.349**	**8.349**
								52.157

BASELINE SCENARIO:													
Emissions Characteristics	**Unit**	**2002**	**2003**	**2004**	**2005, 1-5**	**2005, 6-12**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Production data													
Corrugated materials from PP	#/y	8.525	8.368	10.669	4.445	6.224	10.669	10.669	10.669	10.669	10.669	10.669	10.669
Total number of products	#/y	10.599	10.270	12.765	5.319	7.446	12.765	12.765	12.765	12.765	12.765	12.765	12.765
Average	#/y	9.562	9.319	11.717	4.882	6.835	11.717	11.717	11.717	11.717	11.717	11.717	11.717
Electricity purchased from NEC	MWh/y	1.703	1.530	2.011	836	1.170	2.006	2.006	2.006	2.006	2.006	2.006	2.006
CEF for Electricity Consumption	t CO2eq/MWh	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189
CO2eq Electricity	t CO2eq/y	2.246	2.018	2.652	1.103	1.544	2.646	2.646	2.646	2.646	2.646	2.646	2.646
Total tonnes CO2eq	**t CO2eq/y**	**2.246**	**2.018**	**2.652**	**1.103**	**1.544**	**2.646**	**2.646**	**2.646**	**2.646**	**2.646**	**2.646**	**2.646**
													20.067

PROJECT EMISSIONS:									
Emissions Characteristics	**Unit**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Production data									
Corrugated materials from PP	#/y	10.669	10.669	10.669	10.669	10.669	10.669	10.669	10.669
Total number of products	#/y	12.765	12.765	12.765	12.765	12.765	12.765	12.765	12.765
Average	#/y	11.717	11.717	11.717	11.717	11.717	11.717	11.717	11.717
Electricity purchased from NEC	MWh/y	139	238	238	238	238	238	238	238
CEF for Electricity Consumption	t CO2eq/MWh	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189	1,3189
CO2eq Electricity	t CO2eq/y	183	314	314	314	314	314	314	314
Total tonnes CO2eq	**t CO2eq/y**	**183**	**314**	**314**	**314**	**314**	**314**	**314**	**314**
									2.380

EMISSION REDUCTIONS:									
Scenario	**Unit**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Baseline	t CO2eq/y	1.544	2.646	2.646	2.646	2.646	2.646	2.646	2.646
Project	t CO2eq/y	183	314	314	314	314	314	314	314
Total tonnes CO2eq	**t CO2eq/y**	**1.360**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**	**2.332**
									17.686

Emissions reduction Energy Efficiency Portfolio, Bulgaria [CO2eq/MWh/y]				
Year	SugarPlants	Zebra	Pirinplast	Total
2005	1.814		1.360	**3.175**
2006	7.543	2.064	2.332	**11.940**
2007	8.400	8.349	2.332	**19.081**
AAUs	**17.757**	**10.413**	**6.025**	**34.195**
2008	8.400	8.349	2.332	**19.081**
2009	8.400	8.349	2.332	**19.081**
2010	8.400	8.349	2.332	**19.081**
2011	8.400	8.349	2.332	**19.081**
2012	8.400	8.349	2.332	**19.081**
ERUs	**41.998**	**41.744**	**11.661**	**95.403**
TOTAL	**59.755**	**52.157**	**17.686**	**129.599**

Emissions for Energy Efficiency Projects [tCO2/y]						
Year	Project Scenario	Baseline Scenario	Project Scenario	Baseline Scenario	Project Scenario	Baseline Scenario
	Sugar plants		Zebra		Pirinplast	
2005	4.576	6.391			183	1.544
2006	18.020	25.563	4.929	6.994	314	2.646
2007	17.163	25.563	19.625	27.974	314	2.646
2008	17.163	25.563	19.625	27.974	314	2.646
2009	17.163	25.563	19.625	27.974	314	2.646
2010	17.163	25.563	19.625	27.974	314	2.646
2011	17.163	25.563	19.625	27.974	314	2.646
2012	17.163	25.563	19.625	27.974	314	2.646
TOTAL	**125.577**	**185.332**	**122.681**	**174.839**	**2.380**	**20.067**