

“S V I L O S A” CO

SVISHTOV, BULGARIA

ANNUAL REPORT
FOR GENERATED CARBON
EMISSIONS

PROJECT “BIOMASS BOILER”

PREPARED FOR THE WORLD BANK
CUSTODIAN OF THE PROTOTYPE CARBON FUND (PCF)

APPROVED BY: Dipl. Eng. M. Kolchev – Chief Executive Director

January 2007
The town of Svishtov, Bulgaria



Responsible Care

ISO 14001:2004



Certificate of approval № 23020-A

ISO 9001:2000

Certificate of approval № 170240

I. Introduction

The Pulp Mill has a production capacity of 55 000 t/year ECF – sulphate bleached pulp. As a raw material is used wood from hardwood types: beech, oak, poplar and acacia.

After debarking of the logs and cutting into chips the wood is cooked. The obtained cellulose is washed, sorted and bleached, after that is dried and baled in sheet and blocks. During cooking is used the conventional sulphate (kraft) process, and the bleaching included oxygen delignification, oxygen-alkaline treatment and treating with chlorine dioxide. The processed cooking solution is congested in the Evaporation Plant (EP) and is burnt in the Sodium Recovery Boiler (SRB) in order to regenerate chemicals.

In the raw material preparation process for pulp production are discarded around 50 000 t/year wood barks with moisture of about 65%, which are stock piled on the dumping-ground. The storage depot for wood waste does not respond to the contemporary normative requirements. Intensive decomposition processes of the organic mass take place. The deposited barks decay and self-ignite. The products, which originate from these processes, give negative impact on the groundwaters and the atmospheric air.

The development of the market for reduced carbon emissions gave opportunity to *Svilosa Co* to choose the approach “Combined implementation” and to invest in a project for energy production from renewable source and utilization of the waste barks. The major goals are:

- Avoids the disposal of the fresh waste;
- Utilization of the energy potential of the barks;
- Evasion of the methane emissions from the bark decay;
- Reduction of the methane emissions from the already disposed wood waste;
- Reduction of the amount of burned coals;
- Reduction of the CO₂ emissions as a result of substitution of the coals with biomass.

The project has positive impact on the environment concerning the emission reduction of green house gasses and the air purity in the region, as well as for avoidance of the disposal of waste biomass in future.

II. Structural changes

With our letter № 845/9.V.2006 we have informed you about the carried out structural changes in the company – the Pulp mill is divested as a separate joint stock company *Svilocell EAD*, which is 100% owned subsidiary of *Svilosa AD*.

The production structure includes:

- Production Installation for bleached kraft pulp;
- Installation for production of CMC;
- Water supply, sewerage and communications

In accordance with section 10.11 *Assignment* (a) of the signed on 24.09.2003 *Emissions Reduction Purchase Agreement* between *Svilosa AD*, *Svishtov* and the World Bank, as a trustee of PCF, *Svilosa AD* assigns all rights and obligations regarding the *Agreement* to the company *Svilocell EAD*.

In this relation, considered from 01.01.2006 the operator of the installation *Biomass Boiler* and *Biomass Depot* is *Svilocell EAD*.

The required actions for changes in the project management organization and the Management and Monitoring of the System have been carried out.

The performed restructuring as well as the accounts made on the basis of the results envisaged in the Monitoring Plan single tests, idle time of the boiler for maintenance, the achieved quantities reduced carbon emissions in 2004 and 2005 and the present biomass will not have influence over the quality and the fulfillment of the total quality of contracted carbon emissions according to the first amendment of the Emission Reductions Purchase Agreement (TF.No.052196). (First Amendment to the Emission Reductions Purchase Agreement (ERPA) for the Bulgaria Svilosa Biomass Project)

No suggestions for amendments in the Emissions reduction purchase agreement (ERPA) have been made and we thus consider that they are not necessary.

III. Biomass Boiler

1. Technical properties

In 2003 in Svilosa is erected and launched Boiler for Biomass and production of heat power for the production process in the Pulp Mill. As a primary fuel are used the fresh barks from the logs that are waste from the preparation of the wood for cooking and deferred bark. The produced heat power reduces the necessity of heat, produced in the Electric Power Station, as well as the quantity of used coal.

. The basic installation properties are as follows:

- Fuel: wood barks (fresh and deposited)
- Quantity of fed fuel; 12 500 kg/h barks with moisture 65% and calorific value 1000 ccal/kg
- Capacity: 14t/h concentrated steam with pressure 13 bars
- Power: 11 MW

The basic processes are fuel preparation, fuel feeding, bark burning and production of technological steam. The ashes from the under-grate space and the captured by the multi-cyclone are collected in a closed container for deposit.

The installation was designed and erected by Polytechnics Ltd. company – Pleven, Bulgaria.

At the beginning of 2004 in the period of introduction of the Boiler in exploitation and reaching of the design properties (capacity and power) occurred considerable problems, which solving ended in the end of April. From May 2004 the Boiler is under normal exploitation

2. Changes and maintenance

In order to avoid entering of long wood pieces in the furnace and to provide filtering out of the water from the barks at the exit of the raw material preparation department was assembled a wood-chipping machine.

For providing of normal processing of the installation at the inlet of the burning chamber, additionally is assembled device for capturing of metal particles/pieces.

Concerning the arisen accidents, a journal is filled in, where are stated the type, date and hour of the failure. Measures for their timely removal are being taken.

For the burning process optimization, close to the installation is defined site for temporary storage of the fresh waste and reduction of its moisture content.

In 2005 have been performed the following upgrades of the installation:

On 22.05.2005 is assembled and launched a third feed pump. The pump is produced by a Bulgarian manufacturer. It is assembled in order to increase the safety of the installation.

On 23.05.2005 is assembled and launched second ventilator for smoke fan. Its assembly is motivated by the necessity to guarantee the efficiency of the installation, the safe and effective operation of the multi cyclone.

In April 2006 was purchased and installed a new flow meter for measuring the generated heat energy.

IV. Generated carbon emissions

The amount of generated reduced emissions (t CO_{2e}) and their correspondence with the preliminary contractually agreed are shown in table 1:

Table 1

year	<i>First amendment of the Emissions Reductions Purchase Agreement (7.05.2004)</i>	<i>Reduced carbon emissions according to the report of Svilosa</i>	<i>Verified Carbon Emissions</i>
	ERs, t CO _{2e}	ERs, t CO _{2e}	ERs, t CO _{2e}
2004	17 000	18 938	18 935
2005	37 000	43 324	45 449
2006	33 000	48 445	

In execution of the Emissions Reductions Purchase Agreement (ERPA) the first annual verification of carbon emissions related to the project was performed during the period 31.01 – 3.02. 2005 by JCI /Japan Consulting Institute/ Japan. The results from the verification are summarized in report № JCI-CDM-VER-003-1, Revision No.00, certifying reduction of 18 935 tons of carbon emissions for the period May 2004– December 2004 inclusive.

In the period 27.02. – 2.03.2006 was carried out the second annual verification for certifying the quantity of reduced emissions for 2005. The results from the verification are summarized in report № JCI-CDM-VER-003-1-2P, Revision No.00, certifying the reduction of 45 449 tons of carbon emissions in 2005.

The reports are stored in the office of the project manager.

V. Project Management

1. System for management and monitoring

System for management and monitoring is formed for determination of the responsibilities concerning collection, registering and documenting of the data, necessary for the emissions' calculation and facilitation of the verification processes and certification of the achieved reduced emissions. The personnel, responsible for the process data management is familiar with the procedures from the System for management and monitoring. The responsibilities are clearly defined. A project manager is appointed, who controls the task implementations. The quality manager controls the procedure fulfillment and the data quality for constant improvement of the Management and Monitoring System.

During the second annual verification are prescribed the following forward action requests for implementation:

2P-FAR-1 - Improvement to the Annual Report for Generated Carbon Emissions and Workbook to reflect the rectification of incorrectly copied data and the data period and to unify decimal point formats.

In execution of **2P-FAR-1** are carried out the actions for improving the annual report and the unification of the decimal point. With out letter № 344/13.03.2006 are sent attached the corrected versions of pages 3; 6; 7; 8 and 9 from the Annual report, as well as an electronic version on a CD of the corrected Workbook with the accurate Project Emission Reductions for 2005.

2P-FAR-2 - Measures to avoid data input mistakes and improve manual input form due to present and future malfunctioning of one of the flow meters of the biomass boiler heat meter.

In execution of **2P-FAR-2** are carried out the following activities:

- In order to avoid the risk of incorrect data report and loss of Emission Reduction Units (ERU) is purchased a new flow meter that replaced the malfunctioning flow meter of the biomass boiler heat meter. The new appliance of type PROWILR 72F, is produced by the company Endress + Hauser Elowtec.AG, Germany. Since 1.05.2006 the reporting of the quantity of generated heat is carried out according to art. 4.2.4 of procedure P_04 *Reliability of data in case of malfunctioning of measuring devices*, from the System for Management and Monitoring.

- The format of storing of the quantity of generated heat from the Biomass Boiler, Attachment P_01_PR_03, monthly report for generated heat energy is examined and corrected. A new row indicating the amount of generated heat based on the procedure in art. 4.2.7 P_04 *Reliability of data in case of malfunctioning of measuring devices* is added. According to the procedure in case of malfunction of one of the flow meters the data from the other one is multiplied by two (2).

All carried out changes are reflected in the System for Management.

2P-FAR-3 – Update and reflect in the base project drawings including the process flow diagram

the capital improvements to the biomass boiler, with which have been added an additional third feeding water pump and additional second exhaust gases fan.

In execution of **2P-FAR-3** in the base project drawing are reflected the carried out in 2005 capital improvements as follows:

- installation of an additional third feeding water pump to increase the security of the installation;
- installation of an additional second fan for exhaust flue gases in order to guarantee the output of the installation.

2P-FAR-4 – Improvement of the format of the calibration plan of the main measuring devices and records by adding the corresponding instrument I.D. number in the plan and in the records.

The calibration plan for the main measuring devices for 2007 is prepared. For each of the devices is stated the corresponding I.D. number.

The maintenance and the improvement of the implemented system is ensured by the internal audits that are carried out.

In the period 11.12. – 15.12.2006 was carried out internal audit of the *Management and Monitoring System* of the Biomass Boiler project.

The implementation of Procedure P_04 of the Management and Monitoring System “Reliability of data in case of malfunctioning of measuring devices”, which aim is to regulate the procedure and the method of data reporting in case of malfunctioning of measuring devices. They follow the procedure described in instructions H_10_ZC “Maintenance and control of measuring devices” and: H_14_ZC “Overhaul and maintenance of machines and equipment” part of the Quality Management System ISO 9001: 2000.

The measuring and control devices fulfill the working conditions requirements. A schedule for periodical state verification of the measuring devices for 2006 is also prepared.

2. Data management

All necessary data for the calculation the amount of reduced emissions is collected and filled in the electronic workbook in Excel format. The requirements and principles for data collection in the database of the company are observed.

A contract between *Svilosa Co* and CHPP *Svilosa AD* is concluded for providing of the necessary information during the project operation.

The Project Manager stores all references, signed and sealed

2.1. Single inputs

Prior to the project beginning *Svilosa* carried out 24 horary experiments with the different species of wood. The results are provided in table 2.

Table 2

№	Indicators	Units	Species of the used wood			
			Beech	Turkey oak	Acacia	Poplar
1	Date of the test implementation		17.11.2003	19.11.2003	21.11.2003	11.12.2003
2	Pulp output ¹	t	167	159	161	157
3	Quantity of the used wood ²	t	668	636	644	707
4	Wood moisture ³	%	39,55	42,49	39,06	55,59
5	Quantity of the used absolutely dry wood ⁴	t	403,8	365,8	392,5	313,8
6	Quantity of the obtained waste – barks ⁵	t	131,20	147,76	143,37	87,96
7	Barks moisture ³	%	68,58	68,61	67,37	78,09
8	Quantity of the absolutely dry barks ⁶	t	41,18	46,43	46,78	19,27
9	Barks caloricity ⁸	Gcal/t	0,72	0,67	0,82	0,78
10	Quantity of the obtained waste – shavings ⁵	t	20,57	20,44	20,44	11,22
11	Shavings moisture ³	%	39,55	42,49	39,06	55,59
12	Quantity of the absolutely dry shavings ⁷	t	12,43	11,76	12,46	4,98
13	Shavings caloricity ⁸	Gcal/t	2,26	2,19	2,31	1,51
Notes:						
¹ – the quantities are specified by produced pulp bales weighing during the tests implementation						
² – the quantities are specified in calculative way using the specific costs of wood from the respective species per production unit						
³ – the moisture content is specified in laboratory by analysis of 3 pieces of average tests						
⁴ – the quantities are found in calculative way as a product of the input wood quantity and the content of dry substance in it (row 3 of the table * (100 – row 4 of the table))/100						
⁵ – the quantities are specified by weighing of the trucks with barks (shavings, respectively) that are obtained during the tests implementation						
⁶ – the quantities are found in calculative way as a product of the weighed barks quantity and the content of dry substance in them (row 6 of the table * (100 – row 7 of the table)/100)						
⁷ – the quantities are found in calculative way as a product of the weighed shavings quantity and the content of dry substance in them (row 10 of the table * (100 – row 11 of the table))/100						
⁸ – the caloricity is specified by a laboratory analysis of 3 pieces of average tests						

From the data in Table 2 are defined the following properties:

- Determination of the subordination between produced pulp (at standard moisture) and used wood (on the basis of dry material);
- Determination of the subordination between the used wood and the generated technological waste (barks and shavings);
- Calculation of moisture and caloricity of fresh barks and shavings by wood species (poplar, oak, acacia, beech);
- Proportion of used wood / produced pulp per species;

The heat efficiency of the Biomass Boiler is defined during the 72 – horary test.

The determined factors for one time entries and admissions remain unaltered. In table 3 are stated all data, which are subject to single input in the electronic workbook

Table 3

<u>Fixed conversion factors</u>	Units		
Density of CH ₄	kg/m ³	0,654	
Conversion from CH ₄ to CO ₂ e		21	
Biomass boiler efficiency	%	77,73	
Wood Consumption (dry) to Pulp Production (process mc)	Units		
Acacia	%	244	
Beech	%	242	
Oak	%	230	
Poplar	%	200	
Process waste to input wood ratio (dry basis)	Units		
Acacia	%	15	
Beech	%	13	
Oak	%	16	
Poplar	%	8	
Ratio of wood waste (dry basis)	Units	Bark	Shavings/ Saw dust
Acacia	%	79	21
Beech	%	77	23
Oak	%	80	20
Poplar	%	80	20
Moisture Content of wood waste	%	70	44
Calorific Value of waste	Units	Bark	Shavings/ Saw dust
Acacia	MWh/tonne	0,96	2,69
Beech	MWh/tonne	0,84	2,62
Oak	MWh/tonne	0,77	2,54
Poplar	MWh/tonne	0,9	1,75
Stock piled waste	Units		
Moisture Content	%	46	
Calorific value (ambient moisture content)	MWh/tonne	1,6	

2.2. Monthly inputs

Each month data is entered in the electronic workbook concerning:

- Biomass boiler heat output, *MWh/month* (table 4);
- Pulp output per species, *t/month* (table 5)

The data for these indicators for the 2006 are shown in tables 4 and 5.

Table 4

<i>year</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
<i>Heat output</i>	6476,000	5650,000	5040,000	5820,000	6224,000	4399,000

Table 4 – extension

<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
6011,000	4521,000	4175,000	4064,000	3602,000	3636,000

Table 5

<i>year</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
<i>Poplar</i>	261,446	265,101	215,141	446,934	468,175	609,273
<i>Mixed</i>	1143,034	2689,157	2271,028	4541,506	5124,243	4788,518

Table5 - extension

<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
	296,560	783,769	52,870		506,095
5847,984	3568,212	4412,750	5199,878	3058,899	4910,999

2.3. Annual inputs

Annually in the electronic workbook is entered data for:

- CO2 emission factor of coal;
- Calorific value of coal;
- Thermal efficiency of CHPP;

Because of change in the wood delivery order the electronic model is being modified, as a new Sheet 8 *Blended wood consumption* is added for monthly data input and determination of the percentage ratio of received wood species.

The responsible person for the electronic workbook filling monthly enters data from the reference for delivered wood per species. The results from this Sheet are utilized as inlet data for page 4, cells D15, D16, D17 till L15, L16, L17.

The indicators' data for the 2006 are shown in table 6.

Table 6

Annual Conversion Factors	Units	2006
CO2 emission factor of coal	kgCO2/t	
Calorific value of coal	MWh/tonne	
CHPP thermal Efficiency	%	
Blended wood consumption ratios	Units	2006
-Acacia	%	7,4
- Beech	%	10,2
- Oak	%	82,3

2.4. Others

For the performance of the operative and monitoring responsibilities of the Monitoring Plan, the Project Operator collects regularly data and information for:

- Production of process heat from CHPP – MWh/month (table 7);
- Total generated electricity from CHPP, MWh/month (table 8);
- Delivery of wood, tons/month (table 9);

The records for these indicators for the 2006 are shown in tables 7, 8 and 9.

Table 7

<i>year</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
Heat energy						

Table 7 – extension

<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>

Table 8

<i>year</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>	<i>2006</i>
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
Electric energy						

Table 8 - extension

2006	2006	2006	2006	2006	2006
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>

Table 9

<i>year</i>	2006	2006	2006	2006	2006	2006
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
<i>Acacia</i>	987,774	594,923	1464,904	4062,453	2219,125	542,810
<i>Beech</i>	761,861	342,550	675,521	1884,140	1941,894	1845,575
<i>Oak</i>	4649,520	8247,300	9363,984	15276,443	17184,457	16992,947

Table 9 - extension

2006	2006	2006	2006	2006	2006	
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>	<i>Total</i>
141,070		218,710	1696,800	1678,620	1771,243	15378,432
2215,470	2087,831	1964,021	2043,570	2037,960	3341,080	21141,473
18702,838	12693,748	10227,930	13036,590	17943,990	25907,909	170227,656

2.5. Implementation of the EU Directive for the waste depots

Svilosa Co is committed to constant quality improvement of the environment and cooperates to the Ministry of Environment and Waters (MEO) for the implementation and adaptation of the European Legislation in Bulgaria.

According to the Monitoring Plan of the project *Svilosa* has made an official inquiry to the Ministry of environment and waters regarding the progress in the legislation in the area of depots and the put into compliance of their sites in correspondence with the execution and coming into force of Directive 99/31/EU regarding dung hills. In order to collect the necessary information was used *Questionnaire for waste management*, that is inseparable part of the Monitoring Plan of project Biomass Boiler.

Up to now there is no erected system on the site, which purpose is to capture and burn out the dumping gas.

Dipl. Eng. Y. Gaydarov

Project Manager