

“SVILOSA” 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

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The town of Svishtov, Bulgaria



Responsible Care

ISO 9001:2000

Certificate of approval № 170240

I. Introduction

“*Svilosa Co*” is a company from the chemical industry, which basic productions are the manufacture of viscose rayon and sulphate bleached pulp.

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. 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 is designed and erected by “Polytechnicks” 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.

III. 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 Emissions Carbon</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

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.

The report is kept by the Manager of the project.

In the period 27.02. – 2.03.2006 will be carried out the second annual verification for certifying the quantity of reduced emissions for 2005.

IV. 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 first periodic verification have been prescribed the following action for implementation:

FAR 1 - Renovation of Workbook is considered preferable in the following areas to avoid risks on data mismatch between source data and input data.

In pursuance of FAR 1 have been undertaken actions for renovation of the Workbook in the following areas:

1. Improved the access to the cells in the Workbook

In order to avoid the risk of input mistakes have been undertaken the following actions:

- in Sheet 1, Key for cell colors (page.1, Legend for the colors of the cells) is included a new color for experimentally determined and one time entry values.
- All misplaced colors are deleted from the cells and are colored according to “Legend for the colors of the cells”.
- All calculation cells and fixed data are locked;

2. Normal depiction of the cells

In order to avoid the risks on data transfer the values listed in all input cells, including the number of meaningful digits after decimal points, are identical with the input source data format.

3. *Correct input of SPS provided parameters*

- From Sheet 4 are deleted rows “Coal input” и “Total useful heat output of CHP”
- The cells from row “CHP thermal Efficiency” are already input cells. They are used for the input of the annual values received from SPS.

4. *Table “Monthly Deliveries of Wood” on Sheet 5* (page.5, Monthly delivery of wood) is deleted because it is not necessary for the calculations.

FAR 2 - The upgrading of the Management system is considered preferable in order to avoid risks on data transfer and reporting.

In pursuance of FAR 2 have been undertaken actions for renovation of the Management System. All performed alterations are reflected in the system.

FAR 3 - Values in reports to the PCF should be with the same format and meaningful digits after the decimal point as the values displayed in the excel work sheet and source data to avoid reporting risks.

In pursuance of FAR 3 all values that are included in the present annual report are represented with the same format and meaningful digits after the decimal point as the values displayed in the CD of the filled Woprkbook in excel and source data. The Workbook contains the data for 2004 and 2005, that are used for the calculation of the generated carbon emissions.

The maintenance and improvement of the incorporated system is guaranteed by the performance of internal audits according to approved annual plan/scheme.

In pursuance of the annual plan for 2004 – 2005 for internal audit of the *Management and Monitoring System* of project *Biomass Boiler* have been carried out the following audits:

I. In the period 19.07. – 21.07.2005 is carried out audit regarding procedure Personnel Training from *Management and Monitoring System*. The Personnel Training is regulated by Instruction И-13 from Quality Management System ISO 9001-2000.

In order to guarantee the quality of the achieved reduced emissions have been carried trainings of the operational stuff as it follows:

- Training of newly arrived employees for profession mastery at site and permit of self-dependant work;
- Introduction to the requirements of the Management and Monitoring system.

Minutes containing lists of the people acquainted with the relevant liabilities and obligations were executed during the training.

II.. In the period 28.11 – 02.12.2005 is carried out an audit regarding:

- Reporting of generated reduced emissions;
- Control of responsibilities;

- Management of the system for reporting and control, procedure “Authenticity of data in case of problems with the accounting devices”.

The reporting of the generated reduced emissions is performed according to the order set in Procedure 1, P_01 to the Management and Monitoring system.

All documents listed as Applications to P_01 have been checked. In pursuance of FAR – 2 from the First periodic check the form of the Pulp production report form (P_01_PR_04) is corrected and two new lines were added, for the Total production of pulp from poplar and mixed wood.

The actions in collecting, processing, reporting and storing of data is performed by the employees, listed in Application 2 of P_01. All records containing monthly reports with external and internal data (up to October inc.) are provided to the Person responsible for the fill in of the Workbook. The reports from the Initial verification and from the First annual verification are kept by the manager of the project.

The accounting and control devices comply with the working requirements. A Schedule for periodical state verification of accounting devices for the year has been elaborated.

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 CH4	kg/m ³	0,654	
Conversion from CH4 to CO2e		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 2005 are shown in tables 4 and 5.

Table 4

<i>year</i>	2005	2005	2005	2005	2005	2005
<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>	4969,000	4072,000	5684,000	4347,000	1800,000	4660,000

Table 4 – extension

2005	2005	2005	2005	2005	2005
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
3864,000	1958,000	3758,000	4736,000	4688,000	2942,000

Table 5

<i>year</i>	2005	2005	2005	2005	2005	2005
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
<i>Poplar</i>	619,725	672,073	196,042	422,386	115,265	
<i>Mixed</i>	4778,399	2999,687	4674,481	4966,443	4323,475	4469,612

Table5 - extension

2005	2005	2005	2005	2005	2005
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
	347,674		144,270		506,360
3402,942	2167,368	2840,362	2775,414	2205,605	3004,027

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 2005 are shown in table 6.

Table 6

Annual Conversion Factors	Units	2005
CO2 emission factor of coal	kgCO2/t	
Calorific value of coal	MWh/tonne	
CHPP thermal Efficiency	%	
Blended wood consumption ratios	Units	2005
-Acacia	%	9,8
- Beech	%	10,3
- Oak	%	79,9

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);
- Modifications in CHPP and ancillary plant;

The records for these indicators for the 2005 are shown in tables 7, 8 and 9.

Table 7

year	2005	2005	2005	2005	2005	2005
month	January	February	March	April	May	June
Heat energy						

Table 7 – extension

2005	2005	2005	2005	2005	2005
July	August	September	October	November	December

Table 8

<i>year</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</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

<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>	

Table 9

<i>year</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>
<i>month</i>	<i>January</i>	<i>February</i>	<i>March</i>	<i>April</i>	<i>May</i>	<i>June</i>
<i>Acacia</i>	<i>1716,926</i>	<i>382,884</i>	<i>2359,575</i>	<i>4104,843</i>	<i>2481,321</i>	<i>183,280</i>
<i>Beech</i>	<i>1439,655</i>	<i>478,010</i>	<i>1093,018</i>	<i>2199,142</i>	<i>1899,038</i>	<i>2251,328</i>
<i>Oak</i>	<i>15269,595</i>	<i>5514,448</i>	<i>15598,029</i>	<i>15487,328</i>	<i>7940,746</i>	<i>12678,824</i>

Table 9 - extension

<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	<i>2005</i>	
<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>	<i>Total</i>
<i>123,680</i>	<i>50,603</i>	<i>388,139</i>	<i>1106,523</i>	<i>831,090</i>	<i>1104,620</i>	<i>14833,484</i>
<i>1235,378</i>	<i>699,391</i>	<i>1352,590</i>	<i>1007,010</i>	<i>940,980</i>	<i>954,930</i>	<i>15550,470</i>
<i>10991,852</i>	<i>7768,658</i>	<i>7104,439</i>	<i>7366,300</i>	<i>5472,440</i>	<i>9573,454</i>	<i>120766,113</i>

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.

Project Manager: Dipl. Eng. Y. Gaydarov