

“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)

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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.

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

During 2003 in *Svilosa* is erected and started up Biomass Boiler. 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

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.

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

№		t CO _{2e}
1.	<i>Purchase Agreement of reduced emissions</i> between Svilosa Co and The World Bank (24.09.2004r)	27 800
2.	First amendment of the <i>Purchase Agreement of reduced emissions</i> (7.05.2004r.)	17 000
3.	Generated reported emissions (May – December 2004)	18 937

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.

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

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.

In table 3 are stated all data, which are subject to single input in the electronic workbook.

Table 3

Fixed conversion factors	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 period May – December 2004 are shown in tables 4 and 5.

Table 4

	2004	2004	2004	2004	2004	2004	2004	2004
Month	May-04	Jun-04	Jul-04	Aug-04	Sept-04	Oct-04	Nov-04	Dec-04
Monthly biomass boiler heat output	2667	2737	3561	2212	3866	2772	1866	3443

Table 5

	2004	2004	2004	2004	2004	2004	2004	2004
Month	May-04	Jun-04	Jul-04	Aug-04	Sept-04	Oct-04	Nov-04	Dec-04
Poplar Pulp	162	566	756	167	579	1411	1280	552
Blended Pulp	5482	4476	4646	2670	4722	3832	3881	4891

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 period May – December 2004 are shown in table 6.

Table 6

Annual Conversion Factors	Units	2004
CO2 emission factor of coal	kgCO2/t	
Calorific value of coal	MWh/tonne	
CHPP thermal Efficiency	%	
Blended wood consumption ratios	Units	2004
-Acacia	%	3,6
- Beech	%	12,7
- Oak	%	83,7

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 period May – December 2004 are shown in tables 7, 8 and 9.

Table 7

	2004	2004	2004	2004	2004	2004	2004	2004
Month	May-04	Jun-04	Jul-04	Aug-04	Sept-04	Oct-04	Nov-04	Dec-04
Heat								

Table 8

	2004	2004	2004	2004	2004	2004	2004	2004
Month	May-04	Jun-04	Jul-04	Aug-04	Sept-04	Oct-04	Nov-04	Dec-04
Electricity								

Table 9

	2004	2004	2004	2004	2004	2004	2004	2004	
Month	May-04	Jun-04	Jul-04	Aug-04	Sept-04	Oct-04	Nov-04	Dec-04	Sum
Acacia	625,989	34,990	0,000	19,120	689,742	734,550	662,887	1126,272	3893,540
Beech	1745,670	1097,220	2113,780	2241,828	2080,891	1307,410	1092,566	2099,255	13778,620
Oak	13302,574	12634,763	11204,064	6961,950	4037,820	7737,530	14701,644	20014,203	90594,548

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.

The company made official inquiry to the MEO for legislative modification concerning the setting of the depots in congruence with the normative requirements – amendments in the Bulgarian Regulation №. 13/06.09.2002 referring the implementation and entering into effect of the Directive 99/31/EU for depots/dumping-grounds. For the purposes of data collection is used *Questionnaire for wastes management*, which is inseparable part from the Monitoring Plan of Biomass Boiler Project.

The Bulgarian policy for waste management and depots is adapted to the standards of EU. Directive 99/31/EU is transformed into “Regulation No7 for the requirements, on which should comply with the sites for situation of waste treatment equipment” /amended, SN, issue 81 dated 17.09.2004/ and “Regulation No8 for the conditions and requirements concerning erection of depots and other equipment and installations for utilization and making the wastes innocuous” /amended SN, issue 83 dated 24.09.2004/

All legislative amendments are strictly implemented during the erection of new depots.

The preparation term of plans for setting in compliance with the requirements of the normative regulation for the existing depots is 30.09.2005. The plans stipulate measures for exploitation

suspension, closing and/or setting of the existing depots in compliance with the requirements, with end term of fulfillment:

- Depots for inert and non-dangerous (communal, constructional and production) wastes – till 16.07.2009
- Depots for dangerous wastes – till 31.12.2006

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

According to art. 120 of the Environment Preservation Act, during December 2004 *Svilosa Co* was granted a Complex License, under the terms of which the company is obliged to end the activities as follows:

- Closing of the existing depot for communal wastes till 30.06.2008
- Closing of the existing depot for production wastes till 31.12.2008
- Closing of the existing depot for wood wastes till 30.06.2009

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