

Document of  
The World Bank

Report No: 25098-BUL

PROJECT APPRAISAL DOCUMENT  
ON THE PURCHASE OF EMISSION REDUCTIONS  
PROPOSED BY THE PROTOTYPE CARBON FUND  
IN THE AMOUNT OF US\$1.75 MILLION (MINIMUM)

TO

SVILOSA AD

FOR THE BULGARIA

WOOD RESIDUE TO ENERGY

PROJECT

September 8, 2003

**Infrastructure and Energy Unit  
South Central Europe Country Unit  
Europe and Central Asia Region**

## CURRENCY EQUIVALENTS

(Exchange Rate Effective February 21, 2003)

Currency Unit = Bulgarian Leva (BGN)

BGN 1.00 = US\$0.550303

US\$1.00 = BGN 1.81718

## FISCAL YEAR

1 January – 31 December

## ABBREVIATIONS AND ACRONYMS

BS	Baseline Study
CAS	Country Assistance Strategy
CH <sub>4</sub>	Methane
CHP	Combined Heat and Power
CO <sub>2</sub>	Carbon Dioxide
EA	Environment Assessment
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
ER	Emission Reduction Units
ERPA	Emission Reduction Purchase Agreement
EU	European Union
FRR	Financial Rate of Return
GHG	Greenhouse Gas
GOB	Government of Bulgaria
GWh	Gigawatt hour
HCA	Host Country Agreement
IPPC	Integrated Pollution Prevention and Control, EU Directive 96/61/EC
IRR	Internal Rate of Return
JIU	Joint Implementation Unit
KP	Kyoto Protocol
MEER	Ministry of Energy and Energy Resources
MOEW	Ministry of Environment and Waters
MP	Monitoring Plan
MW	Megawatt
MWh	Megawatt hour
NGO	Non Governmental Organization
NO <sub>x</sub>	Nitrogen Oxide
NPV	Net Present Value
O&M	Operations and Maintenance
PCF	Prototype Carbon Fund
SAD	Svilosa AD
SO <sub>2</sub>	Sulphur Dioxide
tCO <sub>2</sub> eq	ton of CO <sub>2</sub> equivalent
UNFCCC	United Nations Framework Convention on Climate Change

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**BULGARIA**  
**WOOD RESIDUE TO ENERGY**

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MAP(S)  
IBRD 32210

BULGARIA  
WOOD RESIDUE TO ENERGY  
**Project Appraisal Document**  
Europe and Central Asia Region  
ECSIE

**Date:** September 5, 2003  
**Sector Manager/Director:** Henk Busz  
**Country Manager/Director:** Anand K. Seth  
**Project ID:** P075560

**Team Leader:** Sudipto Sarkar  
**Sector(s):** Renewable energy (50%), Power (50%)  
**Theme(s):** Climate change (P), Pollution management and environmental health (P)

**Project Financing Data**

Loan     Credit     Grant     Guarantee     Other: Prototype Carbon Fund (PCF)

**For Loans/Credits/Others:**

**Amount (US\$m):** A minimum quantity of Emission Reductions units - 500,000 tons of CO2 equivalent (tCO2eq) - will be purchased by the Prototype Carbon Fund (PCF) corresponding to a value of US\$ 1.75 million. Under the terms of the Emission Reductions Purchase Agreement (ERPA) the PCF may purchase up to a maximum of 1,000,000 tCO2eq for an amount of US\$ 3.5 million.

Financing Plan (US\$m):	Source	Local	Foreign	Total
BORROWER		3.64	0.00	3.64
<b>Total:</b>		3.64	0.00	3.64

**Borrower/Recipient:** SVILOSA AD  
**Responsible agency:** SVILOSA AD  
Address: Svilosa AD, Sofia, Bulgaria  
Contact Person: Mr. Krasimer Dachev, President

Tel: 359 2 963 0670 / 359 2 963 1352      Fax: 359 2 963 0320      Email: mtg@gti.bg

**Other Agency(ies):**

Ministry of Environment and Water, Joint Implementation Unit  
Address: Ministry of Environment and Water, Sofia, Bulgaria  
Contact Person: Ms. Emilia Kraeva, Head of International Cooperation Department  
Tel: 359 2 940 6298      Fax: 359 2 981 6610      Email:

**Estimated Disbursements ( Bank FY/US\$m):**

FY	2004	2005	2006	2007	2008	2009	2010	2011	2012					
<b>Annual</b>	0.10	0.21	0.24	0.26	0.29	0.28	0.25	0.12	0.00					
<b>Cumulative</b>	0.10	0.31	0.55	0.81	1.10	1.38	1.63	1.75	1.75					

**Project implementation period:** 2003 - 2012. The above disbursements correspond to the purchase of 500,000 tCO2eq by the PCF.

**Expected effectiveness date:** 09/24/2003    **Expected closing date:** 06/30/2013

## **A. Project Development Objective**

### **1. Project development objective: (see Annex 1)**

The overall objective of the project is to reduce emissions of greenhouse gases generated at Svilosa. This objective will be achieved through: (a) substitution of coal with residual wood as a fuel for power and heat generation resulting in a reduction of greenhouse gas emissions; and (b) savings of methane emissions from residual wood waste which would have been stock-piled at the plant. Additional information on Svilosa is provided in Annex 2.

Emission Reduction Units (ER) will be sold to the Prototype Carbon Fund (PCF) following annual independent certification of the emission reduction achievements. ER will be certified under the provisions of the Kyoto Protocol, which is a multilateral agreement to reduce greenhouse gases. The Kyoto Protocol is not yet in effect since a sufficient number of countries, representing 55% of the global CO<sub>2</sub> emissions (1990 levels), have not yet ratified the agreement. Irrespective of the regulatory risk of the Protocol not being effective, PCF has pledged to purchase the ER. This precludes any risks to Svilosa arising from the delays in effectiveness of the Kyoto Protocol.

### **2. Key performance indicators: (see Annex 1)**

Certified ER would be used to determine the project's ability to meet its objective. The actual ER would be dependent on the wood residue generated in Svilosa, which in turn is linked to the company's production of intermediate paper products. Two scenarios of ER are estimated for the project: (a) Realistic case - 1,018,290 tCO<sub>2</sub>eq; and (b) Worst case - 565,450 tCO<sub>2</sub>eq. Based on these scenarios the PCF has agreed to contract the purchase of 500,000 tCO<sub>2</sub>eq with an option to purchase another 500,000 tCO<sub>2</sub>eq (Section C).

## **B. Strategic Context**

### **1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)**

**Document number:** 23927-BUL **Date of latest CAS discussion:** May 31, 2002

The project supports the CAS' environmental development objective to maintain headroom for tradable carbon under the Kyoto Protocol under which Bulgaria committed to reduce anthropogenic emissions of greenhouse gases by 8% compared to emissions in 1988. This implies that Bulgaria is limited to emit no more than 92.26 million tCO<sub>2</sub>eq per year between the period 2008 and 2012. In 2000, Bulgaria emitted 56.58 million tCO<sub>2</sub>eq and the limits set under the Kyoto Protocol are not expected to be reached before 2015. The project will reduce actual greenhouse gas emissions, which will create a greater potential for Bulgaria to trade its unused quota of greenhouse emissions.

This project is Bulgaria's first Joint Implementation application under the Kyoto Protocol through which Bulgaria will receive financial assistance to reduce its greenhouse gas emissions in exchange for another country receiving the corresponding ER.

The project also supports the CAS' objective of promoting privatization and creating an improved business environment. Signing an Emission Reduction Purchase Agreement (ERPA) with the PCF will help to attract foreign investors to Svilosa. Further, the use of environment friendly technology will portray a positive image for the country.

### 1a. Global Operational strategy/Program objective addressed by the project:

The project meets the Prototype Carbon Fund's global objectives in the following manner:

- **High-Quality Emission Reduction:** For the purposes of the Kyoto Protocol, the PCF supports funding of projects that produce high quality greenhouse gas ER, which could be registered with the United Nations Framework Convention on Climate Change (UNFCCC). This convention entered into force on March 21, 1992, and aims to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. All parties to the convention agreed to develop national inventories of greenhouse gas emissions and to submit national communications containing these inventories and reports on mitigation and adaptation activities.
- **Knowledge:** By transacting the business of reducing greenhouse gas emissions, the PCF is developing a knowledge base of business processes and practices to facilitate climate-friendly investment and inform the ongoing UNFCCC negotiations.
- **Public-Private Partnership:** PCF resources are provided by both the public and private sectors. The project demonstrates an effective mechanism to pool public and private resources to address global environmental concerns.

### 2. Main sector issues and Government strategy:

The challenges facing the Bulgarian energy sector include:

- **Energy intensity:** Bulgaria is an energy intensive economy. Energy intensity can be measured by the amount of primary energy resources consumed to produce one unit (US\$) of GDP. Bulgaria's energy intensity is around 1.2 kg of oil equivalent (kgoe) for US\$ 1 of output that is high compared to Hungary (0.54 kgoe/\$US), the Czech Republic (0.74 kgoe/US\$), and Poland (0.61 kgoe/US\$). To be competitive, the Bulgarian economy would have to be less energy intensive through reforms in the energy sector and deliberate steps to improve energy efficiency.
- **Reliance on imported energy resources:** Bulgaria imports about 59% (2000) of its energy resources – oil, gas, and some coal – using foreign currency. Further, the proposed closure of the Kozloduy nuclear power plant (units 1 and 2 in 2003; and units 3 and 4 in 2006) will make the country more dependent on imports of energy resources. The country has very limited domestic oil supplies (1,000 barrels per day production) and only modest quantities of natural gas (5.7 billion m<sup>3</sup> reserves and 29 million m<sup>3</sup> annual production). The main domestic energy source is lignite and the country has reserves of around 2.5 billion tons with an annual production of around 30 million tons. However, the heating values of domestic lignite are typically low. For instance, the lignite from Maritsa, the largest mine in the country, has a value of around 1,500 kcal/kg.
- **Inadequate air quality:** Compared to the early 1990s, air pollution has been significantly reduced in the country due to a decline in industrial activities. However, Bulgaria has a number of 'hot spots' due to air pollution. It is estimated that about one-third of the population is exposed to harmful air quality. Particulates and SO<sub>2</sub> are the most serious pollutants where the World Health Organization's guidelines are sometimes not met. Also, Bulgaria is faced with the major challenge of meeting with EU's environmental requirements. The EU Directive on Integrated Pollution

Prevention and Control (IPPC, Directive 96/61/EC) was adopted as national legislation in 2002. As per this legislation, integrated permits for all manufacturing companies will be issued in a phased manner with full compliance by 2012 and as a result these enterprises are facing mounting investment requirements to meet EU environmental standards.

### **The Government Strategy**

Bulgaria's energy strategy is outlined in the Energy Environment Review (October 2002) that was prepared with the Bank's assistance. Bulgaria is currently implementing this strategy and taking steps to decrease energy intensity, maximize the utilization of domestic energy resources, and improve the environment. The primary mechanism for decreasing energy intensity is reform of the energy sector, which includes pricing reforms that would create an incentive for economic consumption and the introduction of the private sector that would promote more efficient operations. The Government has also drafted an Energy Efficiency Law, in line with EU policies, which is expected to be sent to the Parliament by the end of 2003. In addition, the Government is preparing an Energy Efficiency Strategy that will define specific actions that will help to reduce the energy intensity in the country.

The Government recognizes that complete energy independence is not feasible, but diversification of energy sources and maximization of domestic resources are essential elements of the country's energy strategy. The Government plans to further develop hydroelectric resources, as well as renewable energy sources - biomass, wind, geothermal and solar. This will make the renewables and hydroelectric sources contribute about 25% of the energy production in the long term, compared to the current 15%. There is also a policy to support combined heat and power generation for better fuel efficiency in the industrial and district heating sectors.

With regard to mitigation of environmental impacts, the Government has already re-aligned its environmental regulations to EU Directives and is in the process of implementing them through a phased permitting process. While the full implementation may take up to 10 years, the directives provide the regulatory basis for improving the environment. The country has also been successful in mobilizing EU grant financing for energy efficiency measures. For instance, the EU recently agreed to support Bulgaria with a Euro 30 million grant to make improvements in the Sofia District Heating Company.

### **3. Sector issues to be addressed by the project and strategic choices:**

The Svilosa biomass project contributes in a small but important way to the strategic goals of the Government. Svilosa proposes to utilize biomass, a domestic renewable energy resource, to replace an equal amount of imported coal, thereby reducing the country's dependence on energy imports. Also, it will benefit the environment in a number of different ways including: reduction of greenhouse gases (CO<sub>2</sub> and CH<sub>4</sub>), reduction of emissions associated with coal (particulates, SO<sub>2</sub>, NO<sub>x</sub>, and CO), and reduction of the amount of ash being disposed in an ash pond due to less use of coal. While the project is relatively small compared to the total energy system of the country, it is the first project to be funded under the Kyoto Protocol in the country and is an important first step towards Bulgaria's active participation in the UNFCCC.



## C. Project Description Summary

### 1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

#### Background

Svilosa's principal products are: a) block and sheet cellulose (55,000 tons/year) which are used to manufacture paper; and b) viscose yarn (5,000 tons/year), which is used to manufacture fabric. Over 85% of its products by value are exported to a number of countries including Italy, Germany, Austria, Turkey, Greece, Romania, Poland, Slovenia, Tunisia, and France. Svilosa's factory is located at Svishtov on the Danube River to the north of Bulgaria.

Svilosa uses Bulgarian wood, mainly poplar, acacia, oak and beech, in the production process. Approximately 50,000 tons per year of wood bark and 6,000 tonnes of wood chips are produced annually as waste through the current production process. The wood waste had been deposited on a disposal site adjacent to the plant and over 400,000 tonnes of wood waste had accumulated since 1994. In the spring of 2003, a slow fire started in the stock-piled wood waste. As of mid June 2003 the waste pile was still smoldering, although most of the stock was already depleted. It is unclear how much of the wood waste will remain on site but for purposes of the project, Svilosa has not assumed any use of this stock-piled wood waste given the costs to recover and dry it for use as a fuel. Since the fire started, Svilosa has been disposing the newly generated waste in a different area and this residual wood will be available as a fuel for the biomass boiler supported under the project. After the biomass boiler is operational, no new wood waste is expected to be stored since it would be fully used by the biomass boiler that can consume about 120,000 tons of waste annually compared to a maximum production of around 100,000 tons of new wood waste (realistic case).

Peak energy consumption of the Svilosa facility is 80 MW (59 MW for the cellulose line and 21 MW for the viscose mill). This energy demand is met by a:

- **coal-fired combined heat and power (CHP) plant** with installed capacity of 280 MW heat and 120 MW electricity. Approximately 78% of power produced at Svilosa's CHP plant is sold to the grid. This represents approximately 8% of total revenues for Svilosa; and
- **black liquor recovery boiler**, which has a peak capacity of 33.2 MW. The recovery boiler is a key unit for the production of pulp. The boiler burns the black liquor which is a chemical residue generated during the treatment of wood chips. The boiler serves two purposes: (a) recovery of energy from the black liquor, which reduces Svilosa's energy costs; and (b) recovery of the chemicals (sulphates) from the black liquor that can be reused to process wood chips, reducing the operating costs of chemicals for Svilosa and preventing environmental concerns related to the proper disposal of the liquor.

The entire energy supply system was built in 1970. While the system is old, it is well-maintained. It is estimated that most parts of the system can be operated for at least another 10 years under current management and maintenance. However, the black liquor recovery boiler will require replacement and the company is making plans to upgrade the facility by 2005.

## ER Scenarios

The actual ER would depend on the production of residual wood in the plant, which in turn is linked to the expansion of the company. Two scenarios were analyzed: (a) Worst case, which assumes that there would be no expansion of the plant but a biomass boiler will be put in place; and (b) Realistic case, which assumes that a biomass boiler will be put in place and the company would be able to increase its output capacity by 2005 (Table 1).

The carbon dioxide reductions are due to less use of coal and the methane reductions are due to avoided emissions in the absence of new residual wood being deposited on site. The methane component to the ER is a novel feature of the project and it adds to the total ER in a significant manner since the global warming potential of methane is 21 times higher than carbon dioxide. The energy balances for these scenarios are shown in Annex 2.

**Table 1: ER Scenarios**

Scenario	CO2 Reduction (in tCO2eq)	CH4 Reduction (in tCO2eq)	Total ER (in tCO2eq)
Worst case	221,317	344,133	565,450
Realistic case	394,923	623,367	1,018,290

In the ERPA, the PCF agrees to purchase ER of 500,000 tCO2eq which has been defined as the Contracted ER. The unit price of the purchase would be US\$ 3.5 per tCO2eq. Further, the ERPA provides the PCF with the option to purchase a maximum of another 500,000 tCO2eq of Optioned ER at the same price as the Contracted ER. Svilosa would have to notify the Bank, acting as a trustee of the PCF, on the availability of the Optioned ER within thirty days after two thirds (2/3) of the Contracted ER have been generated. Within six months, the Bank would have to respond to Svilosa and confirm the amount of Optioned ER to be purchased by the PCF. ER to be purchased by the PCF are capped at the maximum amount of 1,000,000 tCO2eq. ER in excess of the maximum amount can be sold in the open market by Svilosa.

If actual ER fall below the Contracted ER amount, then Svilosa would be in default and remedial measures as defined in the ERPA may be implemented. These measures could include: adjustment of the Contracted ER amount to be purchased by the PCF; withholding of payments by the PCF until satisfactory remedial actions are taken by Svilosa; and termination of the ERPA with Svilosa being liable to pay the project preparation and supervision costs to the PCF.

## The Project

**Component A: Biomass Boiler:** The project will add a 13 MW biomass boiler to the Svilosa plant to generate heat. The biomass boiler will be fueled by a) annual wood waste generated in the production process - 100,000 tons in the Realistic case; and around 50,000 tons in the Worst case; and b) wood waste (less than 50,000 tons) stored on site since spring 2003. The use of the biomass boiler will reduce the coal consumption at the CHP plant, reduce greenhouse gas (GHG) emissions associated with using coal in power production, and save methane emissions that would have been generated if the residual wood was stock-piled on site. Certified greenhouse gas emission reductions will be sold to the PCF.

**Component B: Emission Reduction Monitoring and Certification:** A Baseline Study has been conducted and a Monitoring Plan (MP) has been prepared to guide the monitoring and verification process during project implementation. The MP includes clearly defined indicators to observe and verify the continued performance of the project. The verification process involves periodic auditing of monitoring results, the assessment of achieved emission reductions and the project's continued conformance with all relevant criteria. Verification will be conducted at regular intervals during the operational phase of the project by a third and independent entity. Verified emission reductions will be certified to provide assurance that, in the verification period, the project has achieved the stated ER in compliance with all relevant criteria.

Component	Indicative Costs (US\$M)	% of Total	Bank financing (US\$M)	% of Bank financing	PCF financing (US\$M)	% of PCF financing
A. Biomass Boiler	3.41	93.7	0.00	0.0	0.00	0.0
B. ER Monitoring and Certification	0.23	6.3	0.00	0.0	0.00	0.0
<b>Total Project Costs</b>	3.64	100.0	0.00	0.0	0.00	0.0
<b>Total Financing Required</b>	3.64	100.0	0.00	0.0	0.00	0.0

## 2. Key policy and institutional reforms supported by the project:

The project supports Bulgaria in meeting its obligations under the Kyoto Protocol. This is the first project in the country aimed at reducing greenhouse gases and it has raised awareness in the Government of the potential to trade carbon, which would benefit the economy. The project is also in line with the Government's strategy to increase the use of domestic energy sources since it will reduce the dependence on imported coal for the CHP plant. Further, the project supports better environmental management through the use of stockpiled wood as a fuel.

## 3. Benefits and target population:

The primary benefit of the project would be reduction in global greenhouse gases; carbon dioxide and methane.

Other benefits of the project are:

- reduction in fuel costs through the partial substitution of coal with wood waste as a fuel source for power generation;
- reduction in the volume of waste stored on site which creates a safety hazard due to frequent fires;
- reduction in local air pollutants (SO<sub>2</sub>, NO<sub>x</sub>, CO, and particulates)
- reduction in the volume of ash from the coal combustion process; and
- improved overall plant efficiency and modernization of facilities, consistent with the country's effort to realign its environmental standards with the EU.

#### **4. Institutional and implementation arrangements:**

The project will be implemented as per the Emissions Reduction Purchase Agreement (ERPA) to be signed between Svilosa and the Bank, as trustees of the PCF (expected in September 2003). The ERPA was fully negotiated between Svilosa and the Bank on April 17 and 18, 2003. A Monitoring Plan (MP) was agreed between the parties to the ERPA. The ERPA and MP define the quantity, price and other delivery conditions for ER to be purchased by the PCF as well as monitoring and verification systems and methods. Through a Host Country Umbrella Agreement between Bulgaria and the Bank, the Government has also taken on responsibilities to monitor and report progress on the project.

The Project was verified by an independent third party making the ER eligible for purchase by the PCF. Verification and certification of ER generated annually by Svilosa will be coordinated by the PCF which will ultimately purchase the ER. As per the requirement of the Kyoto Protocol, the Bulgarian Government will operate a registry that will manage the transfer of ER generated by the project. There is a possibility that Svilosa will sell the CHP plant to a third party in 2004 and details of the transaction are currently being developed. The project risk associated with the transaction is discussed in Section F.

#### **Svilosa AD**

Svilosa will implement the project and will:

- Maintain and operate the project in accordance with sound business practice and with due diligence and efficiency, to generate the maximum feasible number of ER;
- Undertake all reasonable efforts, including project documentation, to ensure eligibility of ER under Art. 6 of the Kyoto Protocol;
- Provide the Bank with annual audited financial statements and other relevant documentation substantiating the commercial viability of the project and its ability to continue to fulfill the commitments of the ERPA;
- Maintain adequate insurance both during construction and operation of the project with reputable insurers including coverages and risks to be agreed with the Bank, and periodically provide the Bank with insurance certificates; and
- Immediately notify the Bank of anything that may have an impact on the project or its capacity to deliver any ER, including delays, any material adverse change, and events of force majeure.

Specifically, in relation to ER, Svilosa will:

- Monitor the emissions and other relevant parameters;
- Organize periodic auditing of the project and verification that emission reductions have been achieved in compliance with relevant project criteria, including the preparation of required reports;
- Prepare a brief annual or biannual report that should include: information on overall project performance, emission reductions generated and verified and comparison with targets, observations regarding MP baseline scenario indicators, compliance with sustainable development targets, information on adjustment of key MP assumptions concepts, and calculation methods and other amendments of the MP; and
- Ensure certification of verified emission reductions.

#### **Prototype Carbon Fund (PCF)**

The PCF will retain the services of an internationally-recognized, fully independent third Party to verify

and certify the actual ER produced and monitored by Svilosa. The verifier will determine if the project complies with the design and implementation specifications and whether it meets the requirements of the MP. Annual verification of ER generated for the previous year will be recorded in a Verification Report. A Certificate will be issued to record the number of ER generated in accordance with the MP. This certification will allow the ER to be internationally traded. The PCF will only purchase ER that are certified.

### **The Government**

During project implementation the Government will operate the Bulgarian Carbon Central Bank (registry) that will transfer ER equivalent to the certified amounts generated by the project to the registries of countries that are parties to the UNFCCC and participants of the PCF. Further, the Ministry of Environment and Waters will ensure that the appropriate environmental procedures, in line with Bulgarian law, are carried out at Svilosa.

## **D. Project Rationale**

### **1. Project alternatives considered and reasons for rejection:**

Svilosa AD is reliant on imported coal and black liquor generated from the cellulose extraction process for energy. All black liquor produced by the cellulose plant is consumed as an energy input and this is expected to continue in the future. The Project determined the feasibility of substituting coal as a fuel source. Coal is delivered from the Ukraine by barges on the Danube River and is unloaded at the company's port. Svilosa consumes 200,000 - 250,000 tons of coal per annum and the current contracted price is US\$ 27/ton.

The biomass boiler is considered to be the most cost-effective and desirable option based on analysis of the following alternatives:

- **Co-firing with biomass:** The possibility of co-firing biomass waste in the existing CHP boiler is technically feasible, but not cost effective. The boiler conversion cost (estimated at US\$25 million) is prohibitively high. This is because of the boiler's specific design aimed only at the use of coal. Mixing of biomass with coal would require significant changes to the boiler.
- **Fuel switch to oil:** Switching fuel from coal to oil in the CHP plant is feasible, but not economically attractive due to the required boiler modifications and the significant price differential between coal and oil. Heavy oil prices, on a heating value basis, are approximately 3 times higher than the coal price currently paid by Svilosa.
- **Fuel switch to natural gas:** Natural gas is used to meet 17.6 % of Bulgarian's primary energy consumption needs, but natural gas is not available in Svilosa. The closest supply point is 45 kilometers away from Svilosa's factory location and there are no plans to connect Svishtov to the natural gas pipeline. In addition to the investment required to bring the natural gas to Svilosa, an entirely new generation plant would be needed to replace the coal-fired CHP. Further, the fuel costs for Svilosa would increase significantly since the bulk price of natural gas (on the main pipeline) is US\$13.5 per MWh compared to the price of US\$4.8 MWh paid by Svilosa for imported coal.

**2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).**

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
<b>Bank-financed</b> Support of the energy policy and regulatory framework	Programmatic Adjustable Loan (P067051)	S	S
Energy efficiency due to rehabilitation of sub-stations in district heating systems	Water Companies Restructuring and Modernization Project (P008319) - district heating component	S	S
Reduction of ozone depleting substances as per the requirements of the Montreal Protocol	Bulgaria: Ozone Depleting Substances Phase-out Project (P039376). Financed by the Global Environment Facility (GEF)	S	S
Increasing the efficiency and stability of the power system	Energy I (P008316)	S	S
Energy efficiency due to rehabilitation in Sofia and Pernik district heating systems	District Heating Project (P008314)	S	S
Energy efficiency due to rehabilitation in Sofia and Pernik district heating systems	Proposed Bulgaria District Heating Project (P080377) to be financed by PCF		
Promoting energy efficiency	Proposed GEF project		
<b>Other development agencies</b>			

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

**3. Lessons learned and reflected in the project design:**

This is a new type of project in Bulgaria and as a result relevant examples are limited. However, lessons learned in similar projects in the region are reflected in the project design and include:

- **Emphasis on institutional arrangements:** In Bulgaria, which went through a decade of transition, the business environment is still maturing and regulatory reforms are still ongoing. In such an environment private companies like Svilosa have to constantly adjust their business to remain competitive. In this context, the institutional arrangements of the project (Section F) are critical since it would help Svilosa to meet its obligations under the ERPA. The institutional risks of the project were identified and mitigation actions have been incorporated in the project design. The

Monitoring Plan also puts emphasis on institutional arrangements by making Svilosa responsible and accountable for key aspects of project implementation.

- **Involving the Government:** Although the project would be implemented by a private company, it would support Bulgaria's objective of meeting the requirements of the Kyoto Protocol. In this context, it is important that the Government is fully engaged in project preparation and implementation. The Government should also be aware of the worldwide trends related to carbon trading. To this end, the Government has taken on the obligation to be involved in the project through the Host Country Umbrella Agreement. Through the Joint Implementation Unit, located in the Ministry of Environment and Water (MOEW), the Government has been and will be fully informed about developments related to the Kyoto Protocol and the project (paragraph 4 below).

#### **4. Indications of borrower and recipient commitment and ownership:**

The Government has indicated its support for this project through the following actions:

- The MOEW provided a letter of endorsement for the project in 2001;
- The Kyoto Protocol was ratified by Bulgaria on August 15, 2002;
- A Host Country Agreement (HCA) was signed by the PCF, Ministry of Finance and MOEW on November 14, 2002;
- A Joint Implementation Unit has been created within the MOEW that was fully involved in project preparation; and,
- A Letter of Approval, endorsing the Svilosa project, was signed by the Ministry of Environment and Water on February 25, 2003.

Svilosa has shown its commitment through:

- Approaching the PCF for the purchase of ER through a letter dated January 25, 2001;
- Providing a commitment to finance the procurement and installation of the biomass boiler. (contract signed on November 15, 2002);
- Negotiating and agreeing on a Term Sheet with the PCF (November 19, 2002); and,
- Completing preparatory work, including feasibility studies and the preparation of an Environmental Management Plan (February 2003).
- Providing a Letter of Information (dated June 18, 2003) that details the status of procurement of the biomass and recovery of boilers.

#### **5. Value added of Bank and Global support in this project:**

PCF projects are administered by the Bank as per the instruments of the PCF. The Bank has experience in energy and environment matters in Bulgaria and is also familiar with global trends related to greenhouse gas reduction. The Bank has carried out similar projects in the past, which address global environmental issues through grant facilities. The knowledge and experience of the Bank, both with regard to PCF projects as well as general economic and sectoral conditions in Bulgaria, benefited project preparation and will support project implementation.

## E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

### 1. Economic (see Annex 4):

- Cost benefit NPV=US\$1.2 million; ERR = 19 % (see Annex 4)
- Cost effectiveness
- Incremental Cost
- Other (specify)

The project is justified given the above rate of return and also taking into account the positive environmental externalities that have not been quantified for the project. The analysis has been carried out for the "Realistic Case" by taking into account the activities supported under the project. The price to replace the recovery boiler (Total: US\$ 6.9 million - US\$ 5.4 million for a boiler; US\$ 1.5 million for an evaporator) and the associated benefits due to extra sales of Svilosa's products have not been included. However, the cost of the recovery boiler is expected to be fully compensated through additional sales of Svilosa's products.

The positive externalities of the project due to the awareness it is raising about carbon trading have not been included in the analysis. Further, the local environmental benefits due to the reduction of SO<sub>2</sub>, NO<sub>x</sub>, CO, and particulates due to the use of less coal have not been quantified, but these would be benefits of the project.

The assumptions used in the cost benefit analysis are:

- **Costs:** (a) Biomass boiler cost of US\$3.41 million with 85% being expended in 2003 and the remaining in 2004. The boiler is expected to be operational until 2020; (b) Project preparation cost of US\$250,000; (c) Project monitoring cost of US\$25,000 per year between 2004 and 2012; and (d) Additional operating cost of the biomass boiler to be US\$ 161,193 per year between 2004 and 2020.
- **Benefits:** (a) savings due to reduced consumption of coal between 2004 and 2020. The price of coal is assumed to be US\$27/ton; and (b) benefit due to purchase of ER at a price of US\$ 3.5/teCO<sub>2</sub>eq. This benefit would be present between 2004 and 2012, when Svilosa would be able to sell the ER as per the Kyoto Protocol.

### 2. Financial (see Annex 4 and Annex 5):

NPV=US\$ million; FRR = % (see Annex 4)

	FRR	NPV (at 10% discount rate)
Pre-tax estimate	12%	BGN 0.5 million
After-tax estimate	7%	-BGN 0.9 million

A detailed financial analysis, including risks and suggested mitigation measures, was carried out and is available in the project files. The analysis is not reported in this Project Appraisal Document since Svilosa has requested that its financial information be treated as confidential. In addition to the financial analysis, to determine the viability of Svilosa, a separate evaluation was carried out in July 2002. The main conclusions of this report are presented below. The company is aware of its areas of weakness and is taking remedial measures.



- **Strength:** Svilosa has long standing relationships with its clients and has access to European markets. Further, it benefits from a competitive and abundant supply of hardwood, a quality resource; and,
- **Weakness:** (a) Svilosa's unit production cost of cellulose is higher than the cost incurred by its competition. To overcome this weakness, Svilosa has been steadily decreasing its unit production costs in line with the competition; and (b) Svilosa needs to invest in the black liquor recovery boiler, which will be key for the company to maintain its competitiveness. To this end, on April 16, 2003, Svilosa signed a contract to upgrade its recovery boiler, which is expected to be in place by 2005.

The project involving the biomass boiler will result in a net increase in revenues, even without an increase in the production capacity of the plant through the upgrading of the recovery boiler. The assumptions used to determine the positive financial effect of the project are: (a) as in the past, prices for Svilosa's goods would follow cyclical trends; (b) there would be incremental revenues from the ER purchased by the PCF; (c) there would be a net reduction in operating expenses taking into account the fuel savings corresponding to the use of the biomass and operation and maintenance cost of the biomass boiler; (d) Svilosa will continue to operate the CHP plant, although discussions have started about the sale of the plant. This assumption is used since the details of the sales of the plant (sale price; price of heat/electricity) are not yet known; and, (e) profits would be taxed at 25%.

The company plans to carry out the project since it believes that it would be able to generate ER and save on the use of coal, which would justify the investment in the biomass boiler. Further, Svilosa sees this project as an opportunity to promote its environmental image and create goodwill.

#### Fiscal Impact:

The project is not dependent on the central Government budget and as a result will not have a direct fiscal impact. On the contrary, Svilosa will contribute towards increasing tax revenues for the Government due to taxes related to the purchase of imported goods under the project and expected higher profits of the company.

### 3. Technical:

There are no major technical issues related to the project. The Baseline Study, the Monitoring Plan, and the Project Design Document have been validated by an independent third party, allowing the PCF to purchase the ER upon delivery by Svilosa. Technical discussions centered around the optimal size for the biomass boiler and took into account the estimated generation of biomass waste, which is dependent on the production at Svilosa. A biomass boiler with an optional size of 13 MW was selected to take into account the expected growth in the company. The boiler of this size can consume around 120,000 tons of wood waste annually. In the first year (2004), about 50,000 tons of waste will be generated that can be fed directly to the boiler. In addition, wood waste stored on site - since the fire started in the spring of 2003 - will be utilized by the boiler. From 2005, Svilosa's production of cellulose is expected to double which in turn would generate about 100,000 tons of wood waste making the biomass boiler operate at around 80% capacity. The key milestones in the installation of the boiler are:

- Contract signing: November 15, 2002
- Boiler start-up: October 15, 2003

- Commercial operation starts: January 1, 2004
- Expiry of manufacture guarantee: July 1, 2005

#### **4. Institutional:**

##### 4.1 Executing agencies:

Svilosa will execute the project. The majority shareholder of Svilosa is a company called ARUS. The principal owner of ARUS is also the majority owner in Svilosa. ARUS has played an important role in the resolution of old debt of Svilosa as explained in Section F. The Joint Implementation Unit in the Ministry of Environment and Water (MOEW) will ensure that obligations of Bulgaria to the Kyoto Protocol due to the project are fully met.

##### 4.2 Project management:

Svilosa will be responsible for project management, including the procurement of the biomass boiler and completing associated civil works.

##### 4.3 Procurement issues:

As per the Bank's Operations Sector Board decision of June 26, 2001, the Project Appraisal Document does not include any procurement issues since the Bank's procurement guidelines do not apply to PCF projects. Svilosa will be responsible for carrying out procurement under the project as per Bulgarian commercial practices.

##### 4.4 Financial management issues:

PCF projects do not have to follow the Bank's financial management requirements. However, through the ERPA, Svilosa will be required to submit annual audited financial statements to the Bank. The audit would have to be carried out by an independent auditor and would have to comply with internationally accepted accounting and auditing standards and practices.

#### **5. Environmental:** Environmental Category: B (Partial Assessment)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

The Svilosa facility is in the process of renewing its operating license for the site and facilities. The Environmental Impact Assessment (EIA) for the existing facility - not including the biomass boiler - assessed all potential environmental issues in line with the Integrated Pollution Prevention Control (IPPC) Directive to meet EU norms. The draft EIA document has been accepted by MOEW (February 12, 2003) following a public hearing that was held on November 14, 2002. A decision on the operating permit is expected by the end of March 2003.

The MOEW has confirmed (Decision #2-PR/2003 dated February 3, 2003) that an EIA report is not required for the biomass boiler project. An EMP for the biomass boiler project has been prepared in line with Bank requirements.

The installation of the biomass boiler has positive environmental benefits. Apart from the reduction in greenhouse gases, there will be a reduction in local air pollutants (below). In addition, due to less use of coal there will be a reduction of 3,000 tons of ash requiring proper disposal. The characteristics of the ash generated from the biomass boiler will be similar to the ash generated from the CHP. As a result, the ash

from the biomass plant would be disposed of in the ash disposal site for the CHP plant.

**Table 2: Local Air Pollutant Reductions**

<b>Pollutant</b>	<b>Pollutant Reduction (tons/yr)</b>	<b>Reduction in Emissions from Coal Fired Power Plant (%)</b>
SO <sub>2</sub>	324	8.9
NO <sub>x</sub>	207	8.9
Particulates	103	8.9
CO	1.1	8.9

*Source: Svilosa emission measurements, February 2001 and May 2002*

**5.2 What are the main features of the EMP and are they adequate?**

The Environmental Management Plan was prepared for the installation of the biomass boiler on Svilosa's site and covers both construction-related issues and operating impacts. Design of the boiler provides for control of particulate emissions within the required levels by Bulgaria's environmental regulations. Provisions are made to minimize dust, noise and water pollution during construction. During operation, particulates from the boiler will be monitored and ash will be disposed as per Bulgaria's environmental regulations. Wood supply sustainability will be ensured through compliance with Bulgaria's National Forestry Management Plan.

**5.3 For Category A and B projects, timeline and status of EA:**

Date of receipt of final draft: The MOEW has confirmed that an EIA is not required for this project (Decision #2-PR/2003, February 3, 2003)

An EMP was prepared for this Category B project to meet the Bank's requirements.

**5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?**

A public discussion was held on November 11, 2002 at Svishtov on the Environmental Impact Assessment for: (i) the Chlorine Dioxide Production Plant Reconstruction Project; and (ii) all current production facilities on the Svilosa company's site in Svishtov.

Following the Bank's environmental guidelines, a public discussion was also held on December 11, 2002 regarding the Draft Environmental Management Plan (EMP) for the Biomass Boiler Project at Svilosa. During the hearing the EMP was presented and comments were solicited. Questions were raised on the rationale for the project and the boiler design, which were addressed by Svilosa. No specific environmental issues were raised. Minutes of this meeting are included in the EMP.

**5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?**

The environmental monitoring plan for the project is summarized in the EMP. Monitoring measures include site supervision, verification of permits and licensing, monitoring of noise, dust and air emissions.

Greenhouse gas emission reductions will also be monitored. A detailed ER Monitoring Plan has been developed for the project.

**6. Social:**

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

There are no social issues associated with the project. Svilosa is the largest employer in the city of Svishtov and the local population will benefit from the project due to the environmental measures and the steps taken by the company to be competitive. The public was informed about the project through newspapers and a public meeting in the context of seeking comments on the EMP and there has been no opposition to the project.

The local population stands to benefit from the project since it would improve the local air quality due to less use of coal. Further, Svilosa is getting recognition within the country and outside Bulgaria since the project would be the first of its kind in the South Central Europe region. Svilosa's decision to replace the recovery boiler will make the company more competitive and support employment in the region.

6.2 Participatory Approach: How are key stakeholders participating in the project?

In May 2001, the project was introduced to key Government stakeholders in a workshop held in Sofia to provide more information on the Kyoto Protocol and obtain a broad consensus regarding the project. The project was greeted with interest, enthusiasm and support. Since May 2001, a number of meetings have been held with the Ministry of Environment Protection and Water. Further consultations have taken place at a local level on environmental issues associated with this project at Svilosa.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

NGOs and civil society have been consulted during project preparation. They were also invited to participate in the December 11, 2002 public consultation meeting in Svilosa.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

There are no distinct social development outcomes of the project.

6.5 How will the project monitor performance in terms of social development outcomes?

Not applicable.

**7. Safeguard Policies:**

7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Involuntary Resettlement (OP/BP 4.12)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

The project has no major adverse environmental impacts. An Environmental Management Plan has been prepared for the project that provides information on key environmental issues, and measures to manage and mitigate these impacts.

## **F. Sustainability and Risks**

### **1. Sustainability:**

The sustainability of the project mainly depends on the viability of Svilosa. As long as the plant continues to operate it would generate biomass that would be used as a fuel resulting in ER.

In July 2002, a market study was conducted that analyzed the plant's strengths and weaknesses (Section E2). Svilosa is a small producer in the worldwide pulp market and with a production capacity of around 55,000 tons of cellulose per year it would compete with companies that have more than 10 times the production capacity, have a marginal cost advantage, and are located in low cost countries where wood is abundant. However, Svilosa also has certain strengths since it is close to the EU market and has an abundant supply of good quality hardwood, a key raw material. The study concluded that although Svilosa faces intense competition, the company is viable as long as it is able to replace or revamp the recovery boiler. The risks associated with the viability of the plant are described in Section F2.

#### **1a. Replicability:**

The project represents viable use of biomass as a fuel. Such applications can be replicated in Bulgaria and other parts of the world as long as the project can be justified on economic grounds. Further, the lessons learned in Svilosa would help to develop and implement similar projects that would contribute towards the reduction of greenhouse gases.

### **2. Critical Risks** (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

There are two types of risks for the project: Risks to PCF; and Project Risks.

#### **Risks to PCF**

The risk exposure of PCF is limited to the preparation costs since payments to be made by the PCF would be against actual ER which also creates an incentive for Svilosa to implement the project in a timely manner. The preparation cost is estimated to be around US\$ 250,000. As per the ERPA, this preparation cost can also be recovered during implementation, up to a maximum of US\$ 50,000 per year, through adjustments in the annual payments to be made by the PCF to Svilosa.

#### **Project Risks**

This section describes the project risks and associated mitigation measures.

- **Viability of the plant:** The plant's ability to be competitive is dependent on replacement or revamping of the recovery boiler. To this end, Svilosa has taken the following actions: a) signed a contract on April 16, 2003 to replace the recovery boiler. This contract would

become effective upon the first payment made by Svilosa. The new recovery boiler will be imported and Svilosa is currently seeking concessional financing from the export credit agency of the country from which the boiler will originate. Svilosa is expected to secure this financing given that the cost of the boiler can be justified on grounds of additional revenues for the company; b) agreed with ARUS, the parent company, that ARUS would take on the long term debt of Svilosa in lieu of equity. This would improve the cash flow of Svilosa since it would not have to service the long term debt. Additional cash in Svilosa would help to finance the biomass and the recovery boilers. The resolution of this long term debt issue has been confirmed by the commercial bank that held the debt and by the President of Svilosa, who is also the majority shareholder in ARUS.

- **Sustainable wood supply:** Svilosa is the largest consumer of wood in Bulgaria and it currently consumes about 220,000 tons of deciduous wood. This consumption is expected to double with the planned expansion of the plant. To ensure that the wood supply is sustainable, a study was completed as part of project preparation. The study concluded that there is sufficient wood resources in the country to meet Svilosa's increasing demand. The Bulgarian Forestry Management Plan considers that an annual yield of 6.8 million cubic meters of wood is sustainable. Currently, the usage is around 3.7 million cubic meters, representing about 54% of maximum capacity. Further, excepting Svilosa, there has been a steady decrease of wood consumption in the country between 1996 to 2000 and the Forestry Management Plan does not envisage a rapid growth in demand for wood. Thus, given that the Bulgarian forestry resource is under utilized and that the overall demand for wood is not expected to grow, the supply of wood to Svilosa is considered to be sustainable.
- **Institutional arrangement after the sale of the CHP plant:** During implementation, the CHP plant is likely to be sold to a third party. Svilosa will still retain the biomass boiler and will be able to claim the ER based on the reduction of coal use in the CHP plant. However, the monitoring that is planned at the CHP plant (outlined in the Monitoring Plan) would have to be taken over by the new owner, who would have to agree with Svilosa to provide the necessary information in a timely manner. Further, the price of heat and electricity for Svilosa from the CHP plant is critical and this price should be economic to allow Svilosa to increase its competitiveness. Under the ERPA, Svilosa will provide information on the ER from the CHP even after the plant is sold to a third party. Under the ERPA, prior to the divestiture of the CHP plant, Svilosa will provide information to the Bank regarding the contractual arrangements to be established between Svilosa and the owner of the CHP plant.

Risk	Risk Rating	Risk Mitigation Measure
<b>From Outputs to Objective</b> Implementation delays due to the lack of financing for the biomass boiler	M	Svilosa has already signed a contract to purchase the biomass boiler. Evidence of payments made as per the contract is a condition of execution of the ERPA.
Viability of the plant is maintained, generating biomass as a fuel	S	The viability of the plant would be dependent on replacement or revamping of the recovery boiler. To this end, Svilosa has a) signed a contract to replace the recovery boiler and is seeking concessional financing to make the first payment; and b) made arrangements to improve its cash flow by allowing ARUS (the parent company) to increase its equity in Svilosa in lieu of long term debt.
The wood supply is sustainable	M	An assessment has been conducted which confirms the sustainability of the wood supply.
The institutional arrangements after the sale of the CHP plant are clear	H	Under the ERPA, Svilosa would be required to collect information on the ER from the owner of the CHP plant after it is sold. Further, the PCF would review the contractual arrangement to be established between Svilosa and the owner of the CHP.
Lack of Government support for the project	N	The main actions required by the Government have already been taken. Government ownership and commitment to the project is high as has been demonstrated in the signing of a host country unit, formation of the JIU and the letter of approval for this project.
<b>From Components to Outputs</b> Conditions under Emission Reduction Purchase Agreement (ERPA) are met by the project	M	The Monitoring Plan outlines the process to determine the ER. Independent technical audits would be conducted to confirm the ER. Remedial measures may be used in case of non-compliance with the agreements under the ERPA.
<b>Overall Risk Rating</b>	S	The overall project risk is rated as Substantial due to the unique nature of this project, being implemented the first time in Bulgaria. However, adequate risk mitigation measures have been taken to address the risks that have been identified above.

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

### **3. Possible Controversial Aspects:**

None.

## **G. Main Conditions**

### **1. Effectiveness Condition**

Execution of the ERPA by Svilosa and the PCF.

### **2. Other**

#### **Conditions for execution of the ERPA**

- Evidence that payments have been made by Svilosa as per the contract to procure the biomass boiler. Svilosa has provided a Letter of Information (dated June 18, 2003) and a subsequent letter (dated June 25, 2003), which reflects that 80% of the payments have been made by Svilosa as per contract to procure the boiler.
- Evidence that the long term debt of Svilosa has been satisfactorily resolved. Through the Letter of Information Svilosa confirmed that its debt has been purchased by ARUS (the parent company) in lieu of equity and this arrangement will not affect the cash flow of Svilosa. The letter has been signed by the President of Svilosa who is also a majority shareholder of ARUS. There is also a confirmation from the bank that held the debt that ARUS has taken on Svilosa's loan.
- Evidence that satisfactory progress has been made towards upgrading the recovery boiler. As part of the Letter of Information, Svilosa has provided the contract between the company and the supplier of the recovery boiler.

#### **Responsibilities of Svilosa**

Some of the key undertakings of Svilosa under the ERPA are summarized below:

- Carry out the project with due diligence and efficiency and in conformity with appropriate administrative, financial, engineering and environmental practices, in order to generate the contracted ER and, as the case may be, optioned ER, and ensure all relevant funds, facilities and other resources required for the project are available;
- Satisfy any obligations in respect of applications for all licenses, permits, consents and authorizations required to implement and operate the project as required by Bulgarian law;
- Implement all environmental mitigation requirements as set forth in the Environmental Management Plan;
- Inform and share in advance documents relevant to the potential transaction of the Combined Heat and Power Plant; and



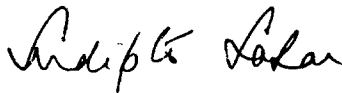
- Ensure the maintenance of the biomass boiler and submit to the Bank a satisfactory plan on the environmentally sound disposal of ash from the biomass boiler.

#### H. Readiness for Implementation

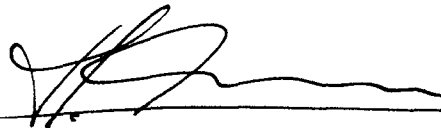
- 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
- 1. b) Not applicable.
- 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- 4. The following items are lacking and are discussed under loan conditions (Section G):

#### I. Compliance with Bank Policies

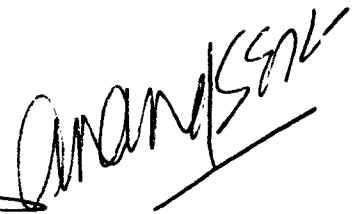
- 1. This project complies with all applicable Bank policies.
- 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.



Sudipto Sarkar  
Team Leader



Henk Busz  
Sector Manager/Director



Anand K. Seth  
Country Manager/Director

**Annex 1: Project Design Summary  
BULGARIA: WOOD RESIDUE TO ENERGY**

<b>Hierarchy of Objectives</b>	<b>Key Performance Indicators</b>	<b>Data Collection Strategy</b>	<b>Critical Assumptions</b>
<b>Sector-related CAS Goal:</b> Project promotes privatization and an improved business environment	<b>Sector Indicators:</b> Greenhouse gas emission reductions (carbon-dioxide) over the period 2004-2012 in Bulgaria.	<b>Sector/ country reports:</b> Bulgaria's UNFCCC reporting	<b>(from Goal to Bank Mission)</b> Government support to climate change program, privatization and this project
<b>PCF Operational Program:</b> Development of a market mechanism for emission reductions	<b>Outcome / Impact Indicators:</b> PCF trade emission reduction credits from Svilosa over the period 2004-2012	PCF annual reports	Continued support for emission reduction by the Government of Bulgaria
<b>Global Objective:</b> Svilosa reduces greenhouse gas emissions as per the Kyoto Protocol.	<b>Outcome / Impact Indicators:</b> Emission reduction credits registered by UNFCCC body over the period 2004-2012	<b>Project reports:</b> Audit and verification process reports	<b>(from Objective to Goal)</b> Framework for market implementation is in place in Bulgaria
<b>Output from each Component:</b> <b>A. Biomass Boiler</b> <b>Installation:</b> Wood-waste and biomass will replace coal used to generate power for an intermediate paper products plant resulting in a reduction in greenhouse gas emissions and local pollutants  <b>B. Emission Reduction Monitoring and Certification:</b> Timely data and analysis carried out to track emission reduction achievements. Independent auditor confirms availability of saleable credits (high quality emission reductions)	<b>Output Indicators:</b>  Reduction of carbon dioxide emissions from less coal use over the period 2004-2012  Certified emission reduction credits for sale over period 2004-2012	<b>Project reports:</b>  Emission reduction certification.  Monitoring and verification protocol implementation reports	<b>(from Outputs to Objective)</b>  Implementation delays due to lack of financing for the biomass boiler  Viability of plant is maintained, generating biomass as a fuel  The wood supply is sustainable  The institutional arrangements after the sale of the CHP plant are clear

			Lack of Government support for the project
<b>Project Components / Sub-components:</b>	<b>Inputs: (budget for each component)</b>	<b>Project reports:</b>	<b>(from Components to Outputs)</b>
A. Biomass Boiler Installation	A. US\$3.41 million	Project progress reports	Conditions under ERPA are met by the project
B. Emission Reduction Monitoring and Certification	B. US\$25,000 per annum (2004 - 2012)	Independent audit reports (annual)	

## **Annex 2: Detailed Project Description**

### **BULGARIA: WOOD RESIDUE TO ENERGY**

A detailed project description is provided in the Project Design Document that can be accessed in the Document Library of the PCF's external website at: <http://www.prototypecarbonfund.org/splash.html>.

#### **Company Background**

Svilosa AD is a manufacturer of bleached sulfate pulp/carboxymethylcellulose (cellulose) and viscose rayon filament yarn. Svilosa was first established as a company for the production of chemicals and is registered as a Joint Stock Company under the Bulgarian corporate law. In 1970, a combined heat and power plant was built which was followed by a pulp plant inaugurated in 1971, a fiber plant in 1972, and a viscose rayon plant in 1976. A fire destroyed the fiber plant in 1987. At present, Svilosa operates mainly two plants: an elemental chlorine free bleached hardwood pulp unit, and a softwood viscose rayon unit. The plants are located at Svishtov on the Danube River the north part of Bulgaria. Svilosa was privatized in 1999.

Svilosa's principal products are the following: block cellulose (30,000 tons/year), sheet cellulose (25,000 tons/year), and viscose yarn (5,000 tons/year). Other products include non-packed glue (1,900 tons/year) and bottled oxygen (80,000 m<sup>3</sup>/year). Svilosa also sells about 120,000 MWh/year of electricity to the national electricity company. Over 85% of the sales (by value) are to export markets. Principal export destinations are: Italy (30 to 40 clients), Germany (10 to 15 clients), Austria (2 clients), Turkey (5 to 10 clients), and Greece (2 to 3 clients); other destinations include Romania, Poland, Slovenia, Tunisia and France.

#### **By Component:**

##### **Project Component 1 - US\$3.41 million**

The proposed project involves installation of a biomass boiler to burn the wood residue (biomass) from the Svilosa facility. The installation of the biomass boiler reduces the amount of coal needed in the CHP (Combined Heat and Power) plant to provide the same energy to the Svilosa facility. As a result, it will replace an equivalent amount of coal; hence reducing the release of greenhouse gases and local pollutants. Also, the utilization of biomass wastes will reduce the release of methane emissions, which would have been released if these wastes were disposed.

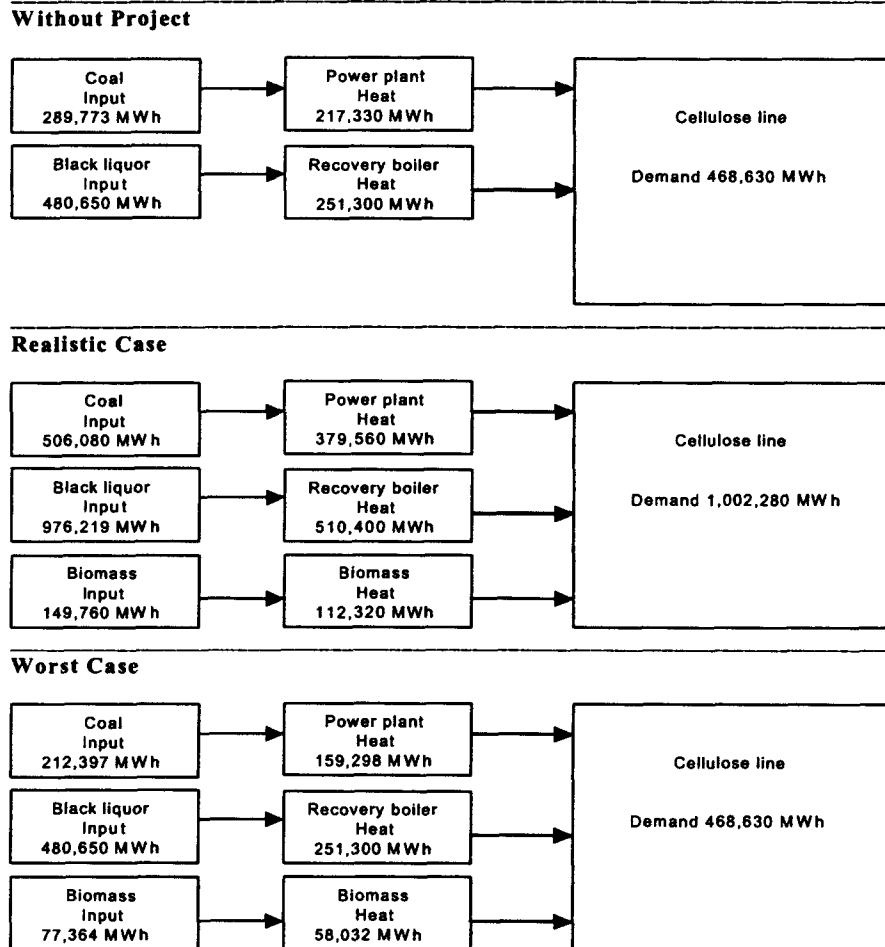
##### **A: Biomass Boiler**

One biomass boiler will be installed, with a capacity of 13 MW (18 tonnes per hour saturated steam at a pressure of between 12 and 15 bar). Two scenarios have been considered for the project: a) Realistic case which assumes that Svilosa will double its production capacity by 2005 generating 1,018,290 tCO<sub>2</sub>eq of emission reductions units (ER) in the period 2004 to 2012; b) Worst case which assumes that no expansion takes place in Svilosa. Under this scenario 565,450 tCO<sub>2</sub>eq of ER are expected to be generated between 2004 and 2012. The Prototype Carbon Fund (PCF) intends to purchase through an Emission Reduction Purchase Agreement (ERPA) a minimum of 500,000 tCO<sub>2</sub>eq ER with an option to purchase up to 1,000,000 tCO<sub>2</sub>eq of ER.

The energy balance of the two scenarios are shown below. In a without project scenario, the energy to the plant is provided by the recovery boiler and the CHP boiler. For the with project scenario, the biomass

boiler will also provide energy to the plant.

**Energy Balance (2004 to 2012)**



**Project Component 2 - US\$0.23 million**

**B: Emission Reduction Monitoring and Certification**

Instructions for monitoring, ER calculation, verification and certification are contained in the Monitoring Plan (MP) for the project, which is part of the design documents.

**Annex 3: Estimated Project Costs**  
**BULGARIA: WOOD RESIDUE TO ENERGY**

Category	Cost (US\$ million)
Component A	3.41
Planning/design	0.03
Civil works	0.55
Biomass boiler	2.35
Project development	0.25
Contingencies	0.23
Component B	0.23
Monitoring/Certification (US\$ 25,000/yr between 2004-2012)	
TOTAL	3.64

**Notes**

- 1 The contract price for the boiler is BGN 4,275,000
- 2 VAT is not included in the above costs since it will be fully reimbursed

## Annex 4: Cost Benefit Analysis Summary BULGARIA: WOOD RESIDUE TO ENERGY

### Summary of Benefits and Costs:

SUMMARY OF EMISSION REDUCTIONS Scenario: Realistic Case												
Units	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 to 2020	
Wood waste (tons)		50,004	100,008	100,008	100,008	100,008	100,008	100,008	100,008	100,008	100,008	
<b>CO<sub>2</sub></b>												
Biomass boiler output	MWh	88,968	112,320	112,320	112,320	112,320	112,320	112,320	112,320	112,320	112,320	
Displaced Coal	t	17,073	21,542	21,542	21,542	21,542	21,542	21,542	21,542	21,542	21,542	
ER from coal	t CO <sub>2</sub> e	35,597	44,916	44,916	44,916	44,916	44,916	44,916	44,916	44,916	44,916	
<b>CH<sub>4</sub></b>												
ER from wood use	Kg CH <sub>4</sub>	408,783	1,209,997	1,975,238	2,704,506	3,401,072	4,068,205	4,705,906	5,314,175	5,896,282	5,896,282	
ER from wood use	t CO <sub>2</sub> e	8,584	25,410	41,480	56,795	71,423	85,432	98,824	111,598	123,822	123,822	
<b>Totals</b>												
Combined ER	t CO <sub>2</sub> e	44,181	70,326	86,396	101,710	116,338	130,348	143,740	156,513	168,738		
Total ER (until 2012)*	t CO <sub>2</sub> e	1,018,290										
Price of ER	US \$/t CO <sub>2</sub> e		3.5									
Value of ER	\$	154,635	246,140	302,385	355,986	407,184	456,218	503,089	547,797	590,582		
Total Value of ER	\$	3,564,016										
SUMMARY OF EMISSION REDUCTIONS Scenario: Worst Case												
Units	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 to 2020	
Wood waste (tons)		50,004	50,004	50,004	50,004	50,004	50,004	50,004	50,004	50,004	50,004	
<b>CO<sub>2</sub></b>												
Biomass boiler output	MWh	88,968	58,032	58,032	58,032	58,032	58,032	58,032	58,032	58,032	58,032	
Displaced Coal	t	17,073	11,134	11,134	11,134	11,134	11,134	11,134	11,134	11,134	11,134	
ER from coal	t CO <sub>2</sub> e	35,597	23,215	23,215	23,215	23,215	23,215	23,215	23,215	23,215	23,215	
<b>CH<sub>4</sub></b>												
ER from wood use	Kg CH <sub>4</sub>	408,783	801,214	1,174,024	1,530,482	1,870,590	2,197,616	2,508,291	2,805,884	3,090,397	3,090,397	
ER from wood use	t CO <sub>2</sub> e	8,584	16,825	24,655	32,140	39,282	46,150	52,674	58,924	64,898	64,898	
<b>Totals</b>												
Combined ER	t CO <sub>2</sub> e	44,181	40,041	47,870	55,355	62,497	69,365	75,889	82,139	88,113		
Total ER (until 2012)*	t CO <sub>2</sub> e	565,450										
Price of ER	US \$/t CO <sub>2</sub> e		3.5									
Value of ER	\$	154,635	140,142	167,543	193,743	218,741	242,777	265,612	287,485	308,397		
Total Value of ER	\$	1,979,075										

\* As per Kyoto Protocol, ER would be purchased until 2012

<b>COST BENEFIT ANALYSIS</b>												
<b>Scenario - Realistic Case</b>												
	Units	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013 to 2020
<b>Incremental Costs</b>												
Investment	\$	2,686,000	474,000									
Project preparation cost	\$	250,000										
Annual monitoring	\$		25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	
Operating expense	\$		161,193	161,193	161,193	161,193	161,193	161,193	161,193	161,193	161,193	161,193
<b>Total costs</b>	<b>\$</b>	<b>2,936,000</b>	<b>660,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>186,193</b>	<b>161,193</b>
<b>Incremental Benefits</b>												
Displaced Coal	t		17,073	21,542	21,542	21,542	21,542	21,542	21,542	21,542	21,542	21,542
Coal Savings	\$		460,968	581,643	581,643	581,643	581,643	581,643	581,643	581,643	581,643	581,643
ER	t CO2e		44,181	70,326	86,396	101,710	116,338	130,348	143,740	156,513	168,738	
ER Value	\$		154,635	246,140	302,385	355,986	407,184	456,218	503,089	547,797	590,582	
<b>Total Benefits</b>	<b>\$</b>		<b>615,603</b>	<b>827,782</b>	<b>884,028</b>	<b>937,629</b>	<b>988,826</b>	<b>1,037,861</b>	<b>1,084,732</b>	<b>1,129,439</b>	<b>1,172,224</b>	<b>581,643</b>
<b>Net Benefits</b>	<b>\$</b>	<b>-2,936,000</b>	<b>-44,590</b>	<b>641,590</b>	<b>697,835</b>	<b>751,436</b>	<b>802,634</b>	<b>851,668</b>	<b>898,539</b>	<b>943,247</b>	<b>986,032</b>	<b>420,450</b>
<b>ERR</b>												<b>19%</b>
<b>NPV</b>												<b>\$1,154,459</b>
<b>Assumptions</b>												
Coal price	\$/ton		27									
CH4:CO2 eq.			21									



**Annex 5: Financial Summary**  
**BULGARIA: WOOD RESIDUE TO ENERGY**

Svilosa AD, a private company, has requested that the financial information of the company be kept confidential. Thus, the financial analysis of the project is not included in the Project Appraisal Document but is available in the project files.

**Annex 6: Procurement and Disbursement Arrangements**  
**BULGARIA: WOOD RESIDUE TO ENERGY**

The Bank's Operations Sector Board took the following decision on June 26, 2001. "There is no need for sections on Bank procurement and disbursement in the PAD. The PCF's objectives are set forth in the PCF Instrument as adopted by the Board resolution". Based on this decision, procurement and disbursement arrangements are not included in the PAD.

**Annex 7: Project Processing Schedule  
BULGARIA: WOOD RESIDUE TO ENERGY**

<b>Project Schedule</b>	<b>Planned</b>	<b>Actual</b>
<b>Time taken to prepare the project (months)</b>		
<b>First Bank mission (Identification)</b>	05/31/2001	05/31/2001
<b>Appraisal mission departure</b>	03/31/2003	04/15/2003
<b>Negotiations</b>	04/02/2003	04/15/2003
<b>Planned Date of Effectiveness</b>	09/24/2003	09/24/2003

**Prepared by:**

Svilosa AD, with the assistance of Energy for Sustainable Development (ESD) Ltd, UK.

**Preparation assistance:**

Project preparation funding has been provided by the Prototype Carbon Fund. The cost of project preparation would ultimately be deducted from the annual payments to be made by the PCF to Svilosa.

**Bank staff who worked on the project included:**

<b>Name</b>	<b>Speciality</b>
Sudipto Sarkar	Task Team Leader
Jane Ebinger	Senior Energy Specialist
Stratos Tavoulaareas	Engineering/ Environment (Consultant)
Doncho Barbalov	Operations Officer
Kishore Nadkarni	Senior Financial Analyst
Benoit Bosquet	Natural Resources Management Specialist (PCF)
Veronique Bishop	Senior Financial Specialist (PCF)
Charlotte Streck	Counsel (PCF)
Claude Devillers	Market Analyst (Consultant)
Yukari Tsuchiya	Program Assistant
Josephine Kida	Program Assistant

**Annex 8: Documents in the Project File\***  
**BULGARIA: WOOD RESIDUE TO ENERGY**

**A. Project Implementation Plan**

Monitoring Plan (MP), Bulgaria: Wood Industries, Svilosa. Biomass Boiler Project, October 2002, Prepared by Energy for Sustainable Development Ltd. (ESD), UK.

**B. Bank Staff Assessments**

Svilosa Project Idea Note, Energy for Sustainable Development Ltd. (ESD), 4th September 2001.

Project Concept Note, Svilosa Biomass Project, Bulgaria.

Project Design Document, Bulgaria: Svilosa Biomass Project, Prototype Carbon Fund, 6 January, 2003.

**C. Other**

Financial Analysis of Svilosa, February 2003

Evaluation on Sviloza (Bulgaria), Report for the World Bank Group, PCF, Claude Devillers, July 2002.

CH<sub>4</sub> Emissions from Biomass Stockpiles - Final Report for the Svishtov Pile, Prepared for World Bank-PCFplus Research, BTG Biomass Technology Group BV, May 2002.

Methane and Nitrous Oxide Emissions from Biomass Waste Stockpiles - Final Report, Prepared for World Bank-PCFplus Research, BTG Biomass Technology Group BV, August 2002.

Baseline Study, Bulgaria: Wood Industries, Svilosa. Biomass Boiler Project, December 2002, Prepared by Energy for Sustainable Development Ltd. (ESD), UK.

Determination Report, Bulgaria: Wood Industries, Svilosa Biomass Boiler Project, Report No. 67962, 2002-11-27, TUV and GFA.

Svilosa Biomass Project, Assessment of Potential Wood Supply Impacts on Forest Sustainability, February 2003, Mr. Mlodanov, ESD Bulgaria.

Environmental Management Plan, Svilosa Wood Residue to Energy Plant at Svishtov, Bulgaria, January 3, 2003.

Term Sheet for the Sale and Purchase of Greenhouse Gas Emission Reductions, by and between Svilosa AD and the International Bank for Reconstruction and Development (IBRD) as Trustee of the Prototype Carbon fund (PCF), November 19, 2002.

Bulgaria Wood Residue to Energy Project, Financial Assessment of Sviloza AD, Draft (2/12/03).

**NOTE** - PCF documents, such as the Baseline Study and Monitoring Plan, can be viewed in the Document Library of the PCF's website at: <http://www.prototypecarbonfund.org/splash.html>.

\*Including electronic files

## Annex 9: Statement of Loans and Credits

### BULGARIA: WOOD RESIDUE TO ENERGY

23-Jun-2003

Project ID	FY	Purpose	Original Amount in US\$ Millions					Difference between expected and actual disbursements*	
			IBRD	IDA	GEF	Cancel.	Undisb.	Orig	Frm Rev'd
P073427	2003	RARP	34.15	0.00	0.00	0.00	37.38	0.00	0.00
P069532	2003	SIEP	50.00	0.00	0.00	0.00	54.03	3.62	0.00
P008314	2003	DISTRICT HEAT	34.20	0.00	0.00	0.00	37.87	-0.40	0.00
P068858	2002	WETLAND REST (GEF)	0.00	0.00	7.50	0.00	8.30	0.35	0.00
P064536	2001	CHILD WELFARE REF	8.00	0.00	0.00	0.00	8.81	7.87	0.70
P055021	2001	REG AND CADASTRE	30.00	0.00	0.00	0.00	33.13	4.24	0.00
P055158	2001	EDUC MOD (APL #1)	14.39	0.00	0.00	0.00	15.35	11.59	0.00
P070086	2000	TRADE & TRANS FACIL IN SE EUR	7.40	0.00	0.00	0.00	7.38	6.19	0.00
P057927	2000	ENV/PRIV SUPT SAL	50.00	0.00	0.00	0.00	19.66	23.35	0.00
P055157	2000	HEALTH SECT REF	63.30	0.00	0.00	0.00	51.47	17.20	0.00
<b>Total:</b>			<b>291.44</b>	<b>0.00</b>	<b>7.50</b>	<b>0.00</b>	<b>273.38</b>	<b>74.02</b>	<b>0.70</b>

**BULGARIA**  
**STATEMENT OF IFC's**  
**Held and Disbursed Portfolio**  
**Jun 30 - 2002**  
**In Millions US Dollars**

FY Approval	Company	Committed				Disbursed			
		IFC				IFC			
		Loan	Equity	Quasi	Partic	Loan	Equity	Quasi	Partic
1999	BAC Bank	0.00	0.00	4.00	0.00	0.00	0.00	4.00	0.00
2001	Bulbank	0.00	17.47	0.00	0.00	0.00	17.47	0.00	0.00
1999	Celhart	1.83	1.50	0.00	0.00	1.83	1.50	0.00	0.00
1998	Devnya Cement	27.42	0.00	0.00	0.00	27.42	0.00	0.00	0.00
2001	Doverie	3.04	0.00	1.78	0.00	2.54	0.00	1.27	0.00
2001	EPIQ	8.93	0.00	0.00	0.00	4.96	0.00	0.00	0.00
1994	Euromerchant FND	0.00	4.86	0.00	0.00	0.00	4.86	0.00	0.00
2000	Florina	4.17	0.00	0.00	0.00	3.87	0.00	0.00	0.00
1996	Interlease Inc.	1.79	0.30	0.00	0.00	0.29	0.30	0.00	0.00
2000/01	Kronospan Group	6.95	0.00	0.00	2.98	6.95	0.00	0.00	2.98
2002	PFS Restr	0.00	2.01	23.49	0.00	0.00	2.01	17.47	0.00
2001	ProCredit Bank	0.00	1.05	0.00	0.00	0.00	1.05	0.00	0.00
1997	Sofia Hilton	11.05	0.00	2.00	8.68	11.05	0.00	2.00	8.68
2001	Sofia Med	13.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Portfolio:</b>	<b>78.58</b>	<b>27.19</b>	<b>31.27</b>	<b>11.66</b>	<b>58.91</b>	<b>27.19</b>	<b>24.74</b>	<b>11.66</b>

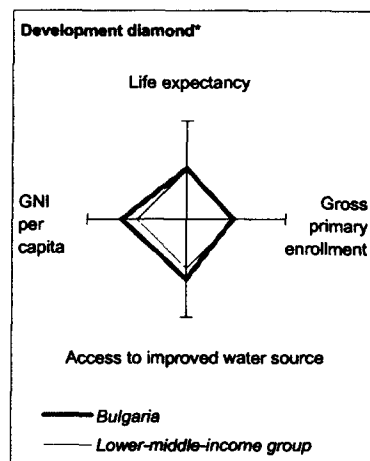
FY Approval	Company	Approvals Pending Commitment			
		Loan	Equity	Quasi	Partic
2002	BAC Bank II	0.00	5.00	0.00	0.00
2002	Unionbank SME	5.00	0.00	0.00	0.00
	<b>Total Pending Commitment:</b>	<b>5.00</b>	<b>5.00</b>	<b>0.00</b>	<b>0.00</b>

## Annex 10: Country at a Glance

### BULGARIA: WOOD RESIDUE TO ENERGY

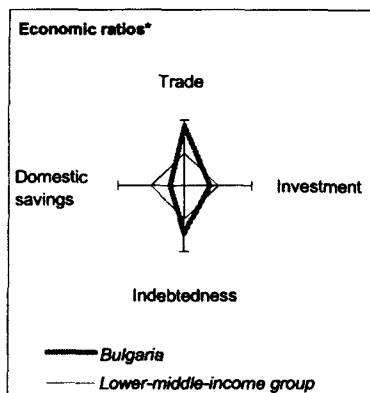
#### POVERTY and SOCIAL

	Bulgaria	Europe & Central Asia	Lower-middle-income
<b>2001</b>			
Population, mid-year (millions)	8.1	475	2,164
GNI per capita (Atlas method, US\$)	1,630	1,960	1,240
GNI (Atlas method, US\$ billions)	13.2	930	2,677
<b>Average annual growth, 1995-01</b>			
Population (%)	-0.6	0.1	1.0
Labor force (%)	-0.5	0.6	1.2
<b>Most recent estimate (latest year available, 1995-01)</b>			
Poverty (% of population below national poverty line)	..	..	..
Urban population (% of total population)	70	63	46
Life expectancy at birth (years)	72	69	69
Infant mortality (per 1,000 live births)	14	20	33
Child malnutrition (% of children under 5)	..	..	11
Access to an improved water source (% of population)	98	90	80
Illiteracy (% of population age 15+)	2	3	15
Gross primary enrollment (% of school-age population)	101	102	107
Male	102	103	107
Female	99	101	107



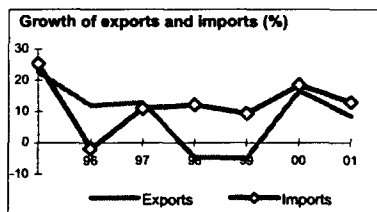
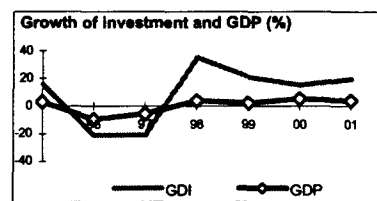
#### KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1981	1991	2000	2001
GDP (US\$ billions)	20.1	10.9	12.6	13.6
Gross domestic investment/GDP	35.5	22.6	18.3	20.4
Exports of goods and services/GDP	35.6	43.5	55.7	55.7
Gross domestic savings/GDP	36.6	26.9	12.9	12.9
Gross national savings/GDP	..	17.3	12.7	14.3
Current account balance/GDP	0.6	-0.7	-5.6	-6.1
Interest payments/GDP	0.2	0.8	4.1	3.8
Total debt/GDP	3.9	107.3	88.9	78.3
Total debt service/exports	0.7	6.6	16.0	19.2
Present value of debt/GDP	..	..	76.3	..
Present value of debt/exports	..	..	131.3	..
	<b>1981-91</b>	<b>1991-01</b>	<b>2000</b>	<b>2001</b>
(average annual growth)				
GDP	2.2	-0.7	5.4	4.0
GDP per capita	2.4	-0.1	5.9	4.6
Exports of goods and services	-11.4	7.2	16.6	8.5



#### STRUCTURE of the ECONOMY

	1981	1991	2000	2001
(% of GDP)				
Agriculture	16.6	15.4	12.3	12.1
Industry	51.9	57.8	25.8	25.2
Manufacturing	..	..	15.7	15.5
Services	31.4	26.8	61.9	62.7
Private consumption	48.7	54.1	69.2	71.1
General government consumption	14.7	19.0	17.9	16.1
Imports of goods and services	34.5	39.2	61.1	63.2
	<b>1981-91</b>	<b>1991-01</b>	<b>2000</b>	<b>2001</b>
(average annual growth)				
Agriculture	-1.9	4.1	-10.3	0.5
Industry	3.0	-3.2	10.6	4.2
Manufacturing	..	..	..	..
Services	4.2	-0.4	12.2	5.9
Private consumption	1.5	-0.5	4.4	5.1
General government consumption	3.7	-6.0	11.7	2.4
Gross domestic investment 1/	-0.1	1.6	15.4	19.9
Imports of goods and services	-12.9	8.8	18.6	13.0



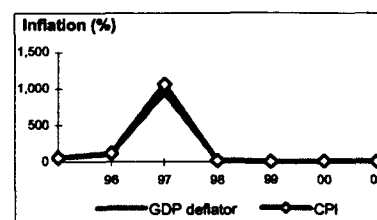
Note: 2001 data are preliminary estimates.

\* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.



PRICES and GOVERNMENT FINANCE

	1981	1991	2000	2001
<b>Domestic prices</b>				
<i>(% change)</i>				
Consumer prices	..	..	10.4	7.5
Implicit GDP deflator	..	226.6	6.7	6.5
<b>Government finance</b>				
<i>(% of GDP, includes current grants)</i>				
Current revenue	..	43.6	38.2	38.1
Current budget balance	..	-1.2	3.2	4.0
Overall surplus/deficit	..	-4.2	0.4	2.1



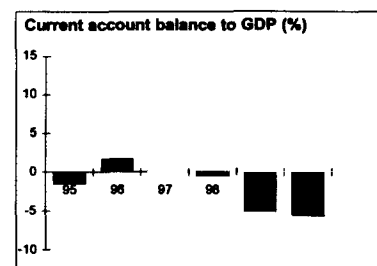
TRADE

	1981	1991	2000	2001
<i>(US\$ millions)</i>				
Total exports (fob)	..	3,737	4,825	5,107
Consumer goods	..	..	1,439	1,715
Investment goods	..	..	552	625
Manufactures	..	..	656	675
Total imports (cif)	..	4,071	6,507	7,261
Food	..	..	175	198
Fuel and energy	..	..	1,775	1,627
Capital goods	..	1,263	1,592	1,816
Export price index (1995=100)	..	..	91	89
Import price index (1995=100)	..	..	105	103
Terms of trade (1995=100)	..	..	87	86



BALANCE of PAYMENTS

	1981	1991	2000	2001
<i>(US\$ millions)</i>				
Exports of goods and services	9,338	4,137	7,000	7,532
Imports of goods and services	9,046	4,255	7,670	8,555
Resource balance	292	-118	-670	-1,023
Net income	-261	-28	-321	-304
Net current transfers	90	69	290	498
Current account balance	121	-77	-702	-828
Financing items (net)	-490	-4	975	1,272
Changes in net reserves	369	81	-273	-444
<b>Memo:</b>				
Reserves including gold (US\$ millions)	..	616	3,460	3,579
Conversion rate (DEC, local/US\$)	..	0.01	2.1	2.2



EXTERNAL DEBT and RESOURCE FLOWS

	1981	1991	2000	2001
<i>(US\$ millions)</i>				
Total debt outstanding and disbursed	773	11,742	11,202	10,616
IBRD	..	61	824	844
IDA	..	0	0	0
Total debt service	68	276	1,170	1,513
IBRD	..	0	76	80
IDA	..	0	0	0
<b>Composition of net resource flows</b>				
Official grants	..	19	74	177
Official creditors	..	29	71	-189
Private creditors	..	30	107	360
Foreign direct investment	..	56	1,002	694
Portfolio equity	..	0	5	-9
<b>World Bank program</b>				
Commitments	..	267	135	88
Disbursements	..	58	71	88
Principal repayments	..	0	27	32
Net flows	..	58	44	56
Interest payments	..	0	49	48
Net transfers	..	58	-5	8

