CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

Annexes

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.

SECTION A. General description of the small-scale project activity

A.1. Title of the small-scale project activity:

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Tugela Mill Fuel Switching Project
Version 1, 10/04/2006

A.2. Description of the small-scale project activity:

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Currently, thermal energy produced for use at the Tugela Pulp and Paper Mill is supplied by coal fired boilers. Specifically, coal fired boilers are used at Tugela Mill to generate steam used for the production of pulp and linerboard. During the production of this pulp and linerboard, the mill generates 70,000 tonnes of bark per year which causes disposal problems, and the bark is currently landfilled as solid waste. The bark comes from the debarking of timber used for the production of pulp and paper products. The timber used is grown in a sustainable manner in certified plantation forests owned by both Sappi and third party operators. The landfill site where this waste bark is currently disposed of is registered with the National government (Department of Water Affairs and Forestry) and has a finite lifespan. Reducing the inputs of bark into the landfill will result in climate benefits, by reducing emissions of methane to the atmosphere, as well as reducing pressure on the capacity of the existing landfill.

The project activity will involve the conversion of a boiler to enable co-firing of biomass (bark), with coal at the Tugela Mill pulp and paper mill. Sappi will use the waste bark for steam generation in a biomass thermal energy boiler. The biomass will directly replace the current use of coal for steam production in the mill. Specifically, the project consists of the complete replacement of the boiler bed and fuel feed conveyor system at the number 10 coal fired boiler to a biomass-fired fluidised bed boiler. The thermal capacity of the new boiler is rated at 22 MWth, and is therefore applicable under the small-scale CDM guidelines (i.e. below 15MW equivalent).

The proposed project activity will, after implementation, result in a reduction of coal consumption due to the increased utilization of biomass as fuel for on-site thermal energy production. The biomass will be used as an alternative fuel offsetting emissions from non-renewable resources (coal) that would have been used in the absence of the project activity. The resulting emission reductions will be monitored and verified against the proposed project activity baselines.

The proposed project activity is comprised of two components:

§ Recovery of biomass that consists of fines, wood chips, logs etc. presently being landfilled at a local registered site.

§ Utilization of the biomass in a co-fired (biomass and coal) power boiler as an alternative fuel to coal to generate thermal energy and steam at Tugela Mill.

The project contributes to sustainable development through the reduction of fossil fuel use, which in turn reduces local air pollution and other environmental impacts associated with the burning of coal.

Apart from emission reductions due to the substitution of coal by biomass, the expected benefits from the project include:

§ The prevention of CH_4 (methane) emissions from landfilled biomass waste;

§ Emissions from transportation of coal from Mpumalanga Province via road and rail (approximately 1000 km round trip) will be reduced;

§ The multiplier effect of this investment is likely to bring additional benefits such as the long-term sustainability of the mill, and thus economic improvement in the area where the project is located;

§ The project will act as a clean technology demonstration project, encouraging development of similar biomass projects throughout South Africa;

§ Demonstrates the use of a new mechanism for funding environmentally friendly technologies, in this case, a mechanism (CDM) which reduces emissions of greenhouse gases; and

The emission reductions from methane avoidance (or other emissions mentioned above) will not be claimed as part of this project, thus making the project "conservative" overall.

A.3. Project participants:

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Table A.1 - Project Participants

Name of Party involved*	Private and/or public entity (ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
South Africa	Sappi	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the small-scale project activity:

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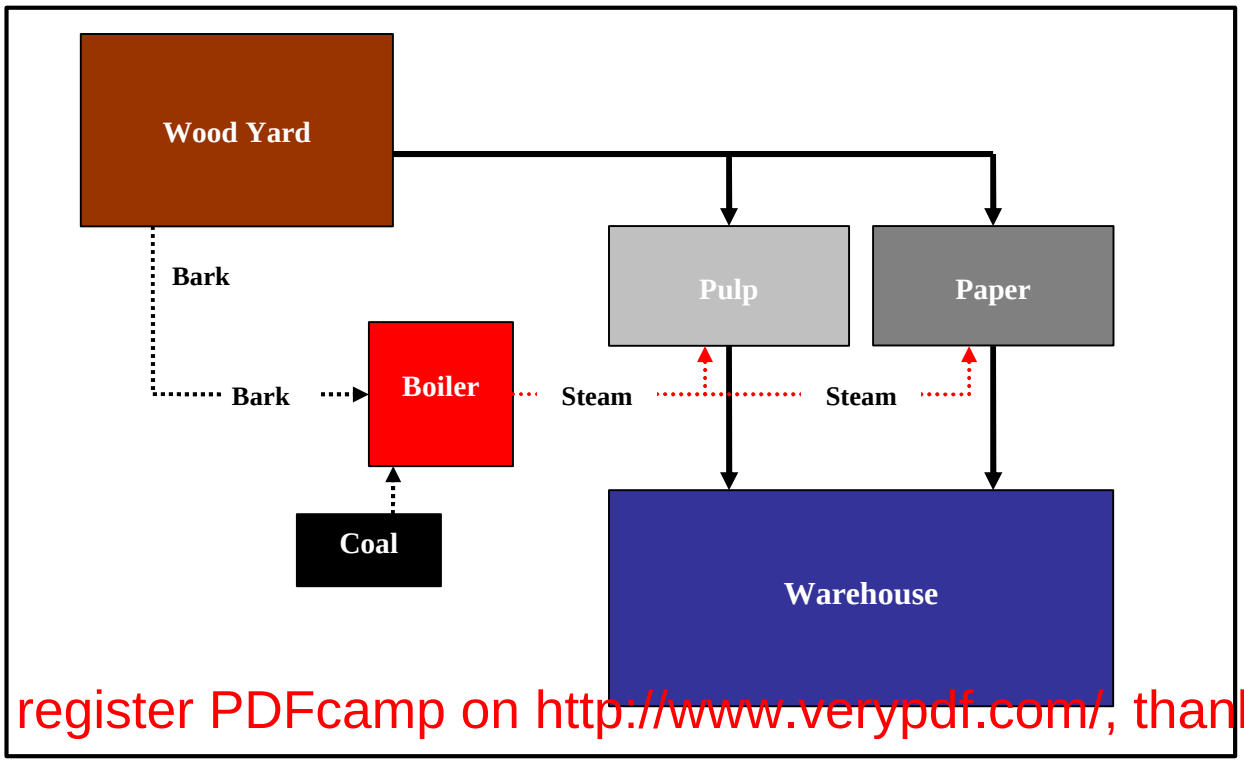
The project involves a fuel switch from coal to biomass at a boiler in the Tugela Mill. The Tugela Mill is an integrated unbleached kraft and semi-chemical pulp and kraft paper mill producing pulp for own consumption (350 000 t/a). The pulp is used to produce kraft linerboard, corrugated medium (300 000 t/a), and other kraft packaging (90 000 t/a). See flowchart (Figure 1.) below for an overview of the entire mill process.

Figure A.1. Tugela Mill Process



The technical changes that will be made in order to implement the biomass fuel switch include:

- removal of chain grate and stokers,
- installation of new feed system,
- start-up burners and bed management system,
- modifications to rear furnace wall tubes, refractories, casing, and framing.
- installation of a new bark conveying system, and
- installation of cyclonic wet gas scrubber and water recycling

Fluid bed boiler combustion technology, the principal element of this boiler conversion, is a tried and tested technology. It has been employed in similar applications in the pulp & paper industry internationally.

Table A.2 below presents details on the key equipment involved in the project.

Table A.2 - Technical Details of Boiler Equipment

Item	Equipment	Manufacturer	Thermal Capacity	Steam Pressure
1	Bark Infeed System	Babcock	N/A	N/A
2	Bark Bin	Babcock/Raumaster	N/A	N/A
3	Bark Screw feed to Boiler	Babcock/Raumaster	N/A	N/A
4	Fluidised bed conversion	Babcock	22MW	1400 kPa
5	FD fan/ducting	Babcock	N/A	N/A
6	Wet Scrubber	Babcock	N/A	N/A
7	ID FAN/ducting/stack	Babcock	N/A	N/A

Tugela Mill discards its woodwaste together with other waste, mainly boiler ash, in its own landfill site. Due to the increased pulp production of the Mill over the past few years, the quantities of waste discarded have increased substantially and reduced the lifespan of the landfill site. Previous investigations showed that if all waste is used for landfill, it would result in a lifespan of 20 years compared to 40 years if it is combusted.

The landfill is located immediately adjacent to the Mill. It is constructed at an incline so as to manage leachate runoff, which is collected and sprayed back onto the landfill. Currently the waste is layered and capped The site is permitted, regulated and monitored by the Department of Water Affairs and Forestry and independent third party auditors in accordance with permit requirements. After compaction the annual space requirement is 300 000m³.

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

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South Africa

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

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Ndondakasuka Municipality (District of Dukusa)

A.4.1.3. City/Town/Community etc:

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Mandini

A.4.1.4. Detail of physical location, including information allowing the unique identification of this small-scale project activity(ies):

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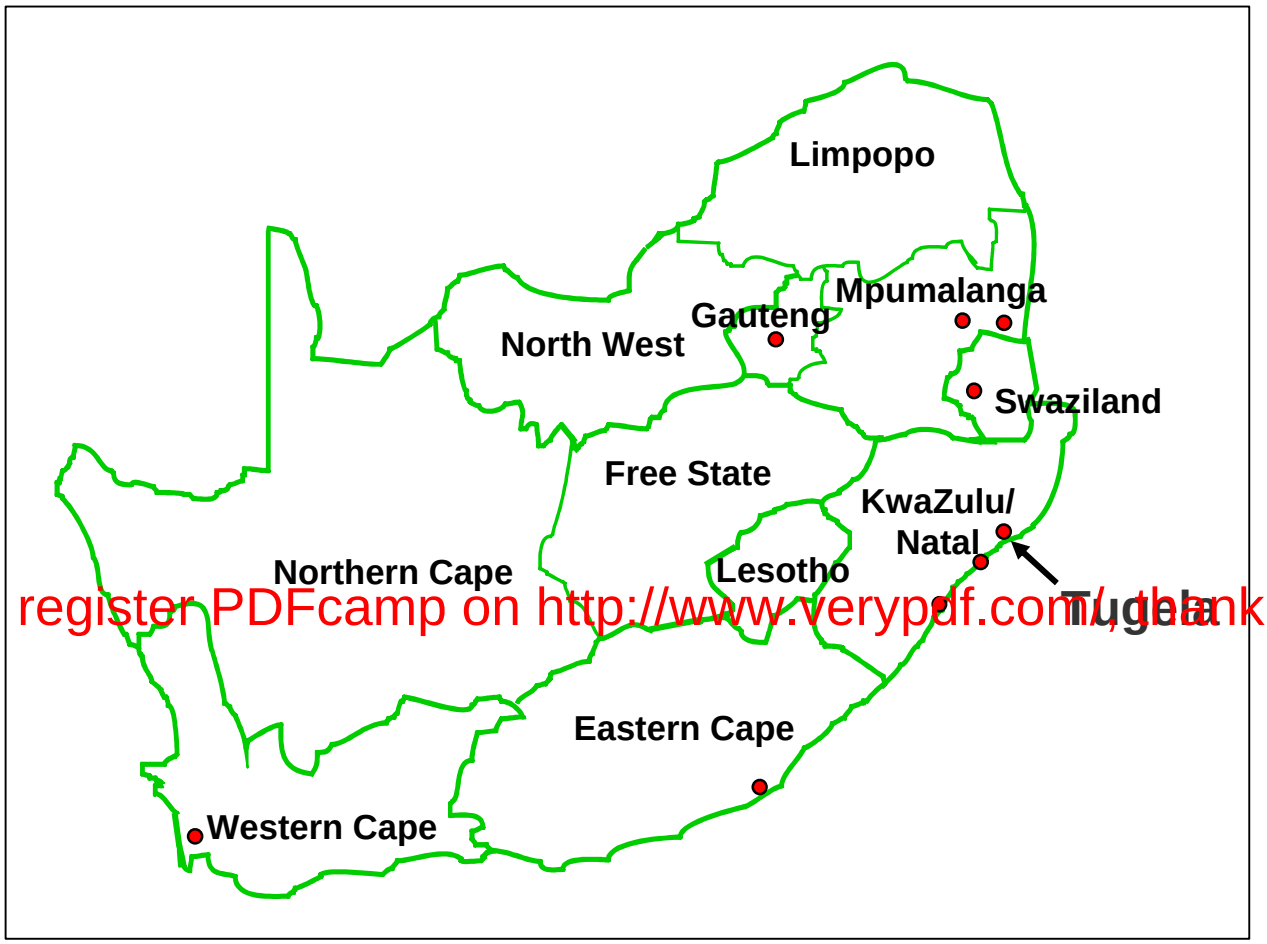
The project will occur at the Tugela Mill in the town of Mandini, which is in the Province of Kwazulu Natal, South Africa. The mill is located on the northern bank of the Tugela River about 10 km's inland from the coast and approximately 100 km north from the city of Durban.

Figure A.2. Map of South Africa and Project Activity location.



A.4.2. Type and category(ies) and technology of the small-scale project activity:

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According to Appendix B of Simplified modalities and procedures for small scale CDM projects version 08, of 03 March 2006, the project activity is type AMS- I.C ("*Thermal Energy for the User*")

The project involves the conversion of a 17.04 MWth capacity coal fired boiler into a biomass fired boiler. The coal based boiler currently generates at 22 tonnes of steam per hour at a pressure of 14bar. Projections and the forecast of maximum demand, indicate that the capacity of the power plant will be rated at 21.68 MWth. This is less than the maximum allowed capacity of 45MWth assigned to the corresponding project type AMS- I.C ("*Thermal Energy for the User*").

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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The projected start date for the project is January 1, 2007, and will replace a boiler which consumes only coal, with a boiler which will primarily utilize biomass (coal will only be utilized during "start-up, and during situations of shortage of biomass). Any coal consumption will be recorded and monitored in accordance with the monitoring and measurement plans. The proposed project activities will, after implementation, result in a reduction of coal consumption due to the utilization of biomass for on-site thermal energy production. The proposed activity will directly reduce greenhouse gas (GHG) emissions from existing and future steam generation from fossil fuels.

The baseline scenario would be the continued use of coal to generate steam for the Tugela Mill. This project will displace the use of coal for steam generation with a renewable carbon neutral alternative, namely biomass (bark). The biomass source utilized in the project activity is renewable as it is derived from sustainable plantation forests.

In accordance with to Sappi's Environmental policies no indigenous trees or trees from controversial sources (i.e. socially, environmentally or economically –are used in the production of Sappi's products. The timber is grown on a commercial basis from pine and eucalypt species specifically for pulp production. A certified management system is employed at all operations which covers all three pillars of sustainable development. All of Sappi's timber is sourced from sites that are registered with the South African Department of Water Affairs and Forestry. Importantly, the proposed Tugela CDM Project will not rely upon plantation forests specifically grown for use as fuel but rather upon existing plantation forest grown for the production of pulpwood for the Mill. Much of the timber sourced is purchased from previously disadvantaged, rural community farmers (refer to 2004 Sappi SD report – www.sappi.com)

Furthermore, the formation of CH_4 (methane) emissions from the component of the biomass waste stream, which is currently landfilled and CO_2 emissions from the transportation of biomass to the landfill site and coal to the Mill will be avoided. As the combustion of renewable biomass is considered carbon neutral, the project activity has no GHG emissions compared to the emissions from the coal boiler, which constitutes GHG emissions in the baseline. Details are provided in section B.

Biomass diverted from the landfill will replace coal as fuel in one power boiler that provides thermal energy to the operations. The reduction, or potentially elimination of, coal used in the boiler will reduce GHG emissions.

When calculating the boiler output, including the calorific value (CV) of the biomass, the efficiency of the boiler and the combustion of the biomass, the boiler is rated 21.68 MW equivalent of thermal power in the biomass boiler. This is below the 45MW for cogeneration projects requirement for small-scale Type 1.C. The steam produced by the boiler is used solely for the provision of process heat for the pulp and paper mill.

Bark & Coal Co-Firing: firing 28 000 kg/hr steam
Enthalpy of steam at 14bar = 2 788 kJ/kg

Thermal Capacity	=	2 788 kJ/kg x 28 000 kg/hr
	=	78 064 000 kJ/hr
	=	78 064 MJ/hr
	=	21.68 MJ/sec
	=	21.68 MW

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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The Project activity will reduce GHG emissions by 72,189 tonnes of CO_2 per year, totalling 505,323 tonnes of CO_2 during the initial 7-year crediting period.

Table A.3. Estimated amount of emission reductions

Please indicate the chosen crediting period and provide the total estimation of emission reductions as well as annual estimates for the chosen crediting period. Information on the emissions reductions shall be indicated using the following tabular format. **For type (iii) small-scale projects the estimation of project emissions is also required.**	
Years	**Annual estimation of emission reductions in tonnes of CO_2e**
Year 1	72,189
Year 2	72,189
Year 3	72,189
Year 4	72,189
Year 5	72,189
Year 6	72,189
Year 7	72,189
***After the initial 7-year crediting period, the baseline will be reassessed, generating a new estimate of emissions reductions yet to be determined.**	
Total estimated reductions (tonnes of CO_2e)	**505,323**
Total number of crediting years	7 (renewable up to 21 years)
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	**72,189**

A.4.4. Public funding of the small-scale project activity:

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The project will not receive any public funding from Parties included in Annex I of the UNFCCC

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a larger project activity:

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This small scale fuel switch project is not part of a larger emission-reduction project given that this is a unique CDM project proposed by Sappi on the east coast of South Africa.

According to *Appendix C* to the Simplified Modalities and Procedures for small scale CDM project activities, the project is not part of a larger CDM project activity. There is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

§ With the same project participants;
§ In the same project category and technology/measure;
§ Registered within the previous 2 years; and
§ Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

Therefore, this project is not a debundled component of a larger project activity.

SECTION B. Application of a baseline methodology:

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

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The project activity is applicable to small-scale project type I.C. - Thermal Energy for the User:

§ Methodology AMS-I.C., -Thermal Energy for the User

From *Appendix B* of Simplified Modalities and Procedures for small scale CDM projects version 8, 03 March 2006.

B.2 Project category applicable to the small-scale project activity:

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The methodology for the Tugela CDM Project is based on Type AMS I.C -"*Thermal Energy for the User"*

The project meets all of the applicable requirements included in AMS-I.C. This category comprises "Renewable Energy Projects". The project involves the conversion of a coal fired 17.04 MWth capacity boiler to a co-fired (biomass and coal) boiler with a 21.68 MWth capacity. Thus, the project involves a boiler with a capacity which is less than the maximum allowed capacity of 45MWth assigned to the corresponding project type AMS- I.C.

The choice of applicable baseline calculation for the project category is justified since the project activity meets the following applicability conditions:

Table B.1. – Methodology AMS-I.C. Requirements

Project Type	Type I-Renewable Energy Project
Project Category	I.C. Thermal Energy for the User
Technology/Measure	This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels or non-renewable sources of biomass. Upgrading of existing equipment is not allowed. Biomass-based co-generating systems that produce heat and electricity for use on-site are included in this category. *Applicable to the Tugela CDM project:* For co-generation systems and/or co-fired systems to qualify under this category, the energy output shall not exceed 45 MWth. E.g., for a biomass based co-generating system the capacity for all the boilers affected by the project activity combined shall not exceed 45 MWth. In the case of the co-fired system the installed capacity (specified for fossil fuel use) for each boiler affected by the project activity combined shall not exceed 45 MWth.
Boundary	The physical, geographical site of the renewable energy generation delineates the project boundary.
Baseline	For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used. Please see section E.
Leakage	If the energy generating equipment is transferred to another activity, leakage is to be considered. *Applicable to the Tugela CDM project:* As no equipment is transferred to another activity in the Tugela project, leakage does not need to be considered.
Monitoring	Metering the thermal and electrical energy generated for co-generation projects. In the case of co-fired plants, such as the Tugela CDM Project, the amount of fossil fuel input shall be monitored

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

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The project activity involves a fuel switch to biomass at a boiler that historically utilized 100% coal. Under the business as usual scenario the boiler would continue to utilize coal, and thus have GHG emissions based on the utilization of coal. As will be demonstrated in the following steps, CDM revenue has been considered from the early stages of development of the project, and it is an integral part of the financial package of the project. Specifically, the boiler conversion has been presented as a potential CDM project as long ago as 2003. The Project Developer took the decision to implement the project after considering CDM benefits under the Kyoto Protocol.

Table B.2. Summary of the baseline scenario and the project scenario:

Baseline and CDM Project Scenarios		
Characteristics	**Baseline Scenario**	**Project Scenario**
Operating boilers	Medium pressure, water tube, moving-grate type coal fired boiler	Medium pressure, water tube, moving-grate type biomass fired boiler
Fuel Input	Coal	Biomass: Significantly reduced amount of coal (coal only to be used during start-up periods and if there are biomass supply problems)

Additionality:

The key to determining additionality of the project is to determine the baseline of thermal generation to the boiler and – related to that – the baseline management of the biomass that will be used to provide thermal energy for the boiler. In absence of the CDM project activity the most likely scenario would be the continued use of coal in the operation of the boiler. Key points below provide justification as to why the most likely scenario would be the continued use of coal:

- The continued use of coal is not regulated by national law, and is therefore legal, providing that all relevant air and water quality emission standards are met, which has been the case throughout the operational history of the plant;
- The coal boiler has a continued lifetime which is longer than the proposed CDM crediting period;
- This activity of coal use is standard for the industry;
- The technology for the use of coal is an accepted technology, and continued operation of existing facilities presents no barriers.

Due to the main points listed above the continued use of coal is the most plausible baseline scenario.

Demonstration of why the Tugela Fuel Switch Project is additional is offered under the following categories of barriers: **(a) Investment Barrier, (b) Technological Barrier, and (c) Prevailing Practice.**

The first condition related to additionality is the demonstration of the absence of mandatory policy or regulations requiring the project activity (i.e. fuel switch). The project activity meets this first requirement, as there are no direct programs or regulations limiting the future use of coal, or initiatives that are mandatory requiring the use of biomass or limiting solid waste volumes. Furthermore, the use of biomass boilers is in compliance with all applicable legal and regulatory requirements in South Africa as long as all the local safety and pollution standards are met (the Tugela project meets these standards). Moreover, all of the relevant environmental licenses that Tugela Mill possesses do not present any requirements related to reducing air pollutants or more specifically, requirements for fuel switch to biomass.

a) Investment Barrier:

The thermal supply from biomass involved the installation of new equipment and an investment cost of approximately ZAR 27 million. CDM has been considered from an early stage and it is an integral part of the financial package of the proposed project activity. There are several financial factors that constrain the ability of the project developer to undertake this project without the additional revenue from carbon finance. These are presented below.

1. In order to replace the current coal-fired boiler with a biomass-fired boiler the unit must be shut down for between 3 to 5 months. Consequently the pulp and paper production processes at this boiler will be interrupted, thus reducing the overall mill production and profitability.

2. The most practical and economically viable option is to continue operating the boiler in its current configuration (i.e. a coal fuelled boiler). An analysis in 2000 recommended the "continued use of the woodwaste for landfill, and to follow the developments closely to be ready for an alternative solution, when the circumstances change." To date the only circumstance that has changed is the CDM process for which South Africa (a non-Annex I country) qualifies. The current configuration of the boiler is still an economically viable alternative and there is no clear financial reason to convert the existing coal fired boiler to any other (biomass included) configuration and there is no reason to assume any other change in circumstances in the foreseeable future.

3. The landfill site is owned by Sappi but an independent waste management contractor is contracted in to manage the site on Sappi's behalf. There are a number of contractual obligations regarding the volume of waste that will now be impinged upon. Sappi may need to compensate the contractor for the contractual obligations that have been breached. This may also affect future contractual negotiations.

The designation of the project as a CDM activity, and the attendant benefits and incentives derived from the project activity, will help alleviate these investment barriers and thus enable the project to be undertaken. The financial benefit from the revenue obtained by selling the CO_2 emissions reductions is one of the main drivers that encouraged the developer to invest in the proposed project activity.

b) Technological Barrier:

Sappi and its associated personnel will be responsible for the operation and maintenance of the biomass boiler, after design and supply by Babcock. Because of the nature of the feedstock, the biomass boiler will be more laborious to operate compared to the coal boilers, requiring more maintenance and the additional training of current staff. It is important to note that technology transfer for this project will occur not only through the purchase and manufacture of technology new to the Mill, but also through the training of Sappi managers, engineers, supervisors and operators. Contractors will also benefit from this project via their involvement in the construction and civil engineering component of the project. This additional form of technology transfer strengthens working relations and understanding among partners at various levels. It also enhances technology cooperation, as well as leads to tangible investments and development of local capacity.

c) Prevailing Practice Barrier:

The Tugela Mill was commissioned in the early 1970's, and operates 9 coal-fired boilers, with the operation of coal-fired boilers is well established, Tugela Mill does not have any biomass boilers in operation. This would be a new practice for all involved at the mill. The conversion to biomass will incur higher maintenance and operational costs, such as biomass storage operations, biomass handling operations, increased maintenance scheduling and training of operators and maintenance technicians. Furthermore, it is important to note that the main business of Sappi is the production of pulp and paper, and the decision to perform the fuel-switch requires additional management effort and time, which detracts from normal operations.

In summary, due to each of the barriers mentioned above, it has been demonstrated that the approval and registration of the project as a CDM activity, and the attendant benefits and incentives derived from the project activity, will alleviate the barriers indicated above and thus enable the project to be undertaken. The approval and registration of the CDM project activity will alleviate the identified barriers by providing additional revenue to the Tugela Mill from the sale of emission reductions. It can therefore be clearly demonstrated that the proposed CDM project activity is not the baseline scenario. Anthropogenic greenhouse gases will be reduced according to the calculations in the following sections, and these have been shown to be additional in accordance with international guidelines.

Projects such as the Tugela Mill boiler conversion assist CDM host countries in achieving multiple sustainable development objectives (economic development, improvement of local environmental quality, minimisation of risks to human health from local pollutants, and reduction of greenhouse gases). Further to direct project knowledge transfer, there will also be CDM knowledge transfer to various levels of Sappi personnel on the CDM processes (this is the first CDM project developed by Sappi) and local auditors whom are employed by designated operating entities (DOE's). The project will be the first CDM project attempted by Sappi as a global company and is viewed in some quarters with a certain degree of scepticism. A successful CDM project at Tugela Mill will go a long way to alleviating these concerns and lead to the initiation of future CDM projects in South Africa.

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

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As stated in *Appendix B* for small-scale project activities, the project boundary for small-scale renewable energy projects is defined by the physical, geographical site of the renewable energy generation. The project boundary of the Tugela CDM Project activity encompasses the physical, geographical area of the Tugela Mill.

A brief description of all sources of baseline and project emissions appears below:

The baseline is defined as that which would have occurred in the absence of the project activity, which is the consumption of coal for the production of steam at the Tugela Mill. The baseline is based on the amount of CO_2 emissions as a result of the combustion of coal.

Conforming to the guidelines and rules for small-scale project activities, the emissions related to production, transport and distribution of the fuel used in the power plants in the baseline are not included within the project parameters, as these do not occur within the project boundary. For the same reason, emissions related to the transport of coal are also excluded from the project boundary.

The activity of the proposed Tugela CDM Project is the generation of steam. This activity is under the control of the project developer and is to be included within the project boundary. The emissions related to biomass steam production are zero, as the fuel source is a renewable source of biomass. Aside from the relatively small amount of coal that will be used during the boiler start-up phase of the project, no other direct on-site GHG emission sources have been identified. These emissions from the use of coal during start-up, and also any coal used during times of a lack of biomass supply will be captured within the monitoring plan. Furthermore, the electricity used for the operation of the biomass conveyer is considered to be offset by the electricity otherwise used for the operation of the coal conveyor in the baseline.

B.5. Details of the baseline and its development:

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For baseline calculations the data used is the most recent possible. Date of completion of baseline development is April, 2006.

EcoSecurities Ltd is the entity determining the monitoring plan and participating in the project as the Carbon Advisor. EcoSecurities is not a project participant. The person in charge of its development is:

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SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

C.1.1. Starting date of the small-scale project activity:

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01/01/2007

C.1.2. Expected operational lifetime of the small-scale project activity:

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The operational lifetime of the technology is in excess of 25 years; however, the crediting period will be limited to a maximum of 21 years.

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

C.2.1. Renewable crediting period:

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The 21-year renewable crediting period (three 7-year renewable periods) has been opted for the proposed project.

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

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01/01/2007

C.2.1.2. Length of the first crediting period:

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7y-0m

C.2.2. Fixed crediting period:

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Not applicable

C.2.2.1. Starting date:

>>

Not applicable

C.2.2.2. Length:

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Not applicable

SECTION D. Application of a monitoring methodology and plan:

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

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For project type AMS-I.C. – *"Thermal Energy for the User"*, the relevant monitoring shall involve:

- Metering the thermal and electrical energy generated for co-generation projects. In the case of co-fired plants, the amount of fossil fuel input shall be monitored.

The thermal energy generated by the co-fired biomass boiler will displace thermal energy generated by fossil fuels in the absence of the project activity. In such cases, baseline emissions are calculated by multiplying the savings of fossil fuels with the emissions factor of these fuels.

From *Appendix B* of Simplified Modalities and Procedures for Small Scale CDM projects version 8, 03 March 2006.

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

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The Tugela CDM project activity is applicable to small-scale Project type I.C. – *"Thermal Energy for the User"*:

The project complies with criteria required by this category since the project involves a renewable energy technology that supplies a user with thermal energy that displaces fossil fuels or non-renewable sources of biomass, and is a co-fired system with an energy output that does not exceed 45 MWth. The project is an integral part of the mill and all relevant operating procedures and specifications will be included into the Mills integrated management system. This system is internationally certified by independent third party auditors. The certifications are ISO 9001:2000 and ISO 14001. OHSAS 18001 systems are implemented and certification is expected during 2007. The primary timber supplier (Sappi Forests) is also certified to the Forest Stewardship Council (FSC) requirements.

Monitoring of the actual project activity shall involve:

§ Determining the historical coal consumption, coal calorific values and steam production data for a number of years prior to the project based on the business as usual coal firing of the boiler. This determination will occur prior to the fuel switch being implemented and used in the development of the baseline. The data is all available as part of the mill's ISO 9001 quality management system.

§ The consumption of biomass, after the fuel switch, the resulting production of steam, and the calorific values of both the biomass and coal will be monitored.

in order to monitor emissions from the project activity, and how this data will be archived.

ta nit	Calculated (c) Indicated (I) or Measured (m), estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	How long will the data be kept?	Comment
nne	m	Daily	100%	Electronic and paper	2 years past the ending of the crediting period	A calibrated weightometer will be installed on the biomass feed conveyor
nes/ ur	m	Daily	100%	Electronic and paper	2 years past the ending of the crediting period	
/kg	m	As required	100%	Electronic and paper	2 years past the ending of the crediting period	
/kg	m	As required	100%	Electronic and paper	2 years past the ending of the crediting period	
kg	m	As required	100%	Electronic and paper	2 years past the ending of the crediting period	

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

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Once implemented, the relevant data report will be submitted to a designated operational entity contracted to verify the emission reductions achieved during the crediting period. Any revisions requiring improved accuracy and/or completeness of information will be justified and will be submitted to a designated operational entity for validation. All monitoring and measurement will form part of the integrated ISO 9001 & ISO 14001 management systems and will as such form part of internal, second and third party audit schedules. The plan does not include monitoring of any variable regarding leakage since no leakage calculation is required.

Table D.2 - Quality Control and Procedures

Data	Uncertainty level of data: (high, medium, low)	Are QA/QC procedures planned for these data?	Explain QA/QC procedures planed for these data, or why such procedures are not necessary
1-4	Low	Yes	Measuring instruments will be calibrated and maintained regularly. The measurement of biomass consumption is measured by the plant itself, since it is the "supplier" of the biomass.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

The Project Developer will have designated shift technicians on site 24 hours a day which will be responsible for monitoring data required for the calculation of emissions reductions of the project activity.

- The biomass produced at the plant is the only source of biomass to the plant, and thus it is easily identifiable, separated and quantified (including the measurement of CV values)
- The coal will be monitored by existing measuring devices at the boiler (i.e. through steam production and CV values).
- The data will be monitored and recorded by qualified technicians according to the monitoring plan.
- The data will be electronically archived.

Proper management process and routine procedures are already in place to ensure the quality of reports required by verification audits. All required project requirements will be incorporated into the existing ISO management systems.

D.6. Name of person/entity determining the monitoring methodology:

>>

EcoSecurities Ltd is the entity determining the monitoring plan and participating in the project as the Carbon Advisor. The person in charge of its development is:

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SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

>>

Not applicable

E.1.1 Selected formulae as provided in appendix B:

>>

This is not applicable as no formula is provided. Since Appendix B does not provide a formula, the GHG estimation options below will be used to determine the total emissions avoided by the project.

The baseline emissions for the steam generation component is calculated using Appendix B, section I.C. "Thermal Energy for the User" paragraph 5 of the simplified modalities and procedures for a small-scale CDM project activities:

Paragraph 5 states:

"For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emissions coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used."

E.1.2 Description of formulae when not provided in appendix B:

>>

Formulae are described below in section **E 1.2.1 and E.1.2.4**

E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

The project activity uses renewable biomass as the main energy source. The net balance of CO2 emissions from renewable biomass is considered zero. A relatively small amount of coal will also be used during the project activity, and therefore, the emissions associated with this will also calculated. This coal use will likely occur mainly during start-up and periods where there are any biomass supply problems. As, the electricity consumed during the operation of the biomass conveyer will not be significantly different than the electricity consumed in the baseline, emissions from electricity are not considered for this project.

The total steam production during the project activity is estimated to be 227,632 tonnes/year. Of the 227,632 tonnes of steam, 196,434 tonnes are estimated to be solely derived from Biomass (due to the constraint on total biomass available annually). The difference in total steam and that produced by biomass will be derived from the use of coal. Thus, the amount of steam that is estimated to be produced from the consumption of coal is 31,198, tonnes/steam a year (i.e. steam production associated with CO2 emissions in the Project Activity).

The formula used to calculate the amount of energy required for the amount of steam produced via coal is:

(1) Er_p= Sr_p * (Se/Be_p)

Where:

Er_p= the quantity of energy required to produce the estimated amount of steam via coal (in TJ/year).
Sr_p= the steam required in project scenario from coal (t/year)
Se= the energy content of the steam required (kj/kg)
Be_p= the efficiency of the new boiler

Amount of energy required:

Er_p = (31,198t/year) * (2788 kj/kg) / (0.85)
Er_p = 102.3 TJ/year

The formula used to calculate the quantity of coal used in the project scenario:

(2) Co_p = Er_p/CVc

Where:

Co_p= the quantity of Coal used in the project scenario (in tonnes) per year.
Er_p = the quantity of energy required to produce the estimated amount of steam per via coal (in TJ/year).
CVc = the net calorific value of coal utilised in the project activity (in TJ/kilotonne).

The quantity of coal used in the project scenario:

Co_p= (102.3 TJ/year) / (26.6 TJ/kilotonne)
Co_p= 3.846 kilotonne/year
Co_p= 3,846 tonnes/year

The formula used to calculate the Project Activity Emissions is:

(3) PE = Co_p * EF_Co

Where:

PE = the Project Activity Emissions (in t CO_2/year)
Co_p= the quantity of Coal used in the project scenario (in tonnes) per year.
EF_C = the CO_2 emission factor per unit of coal associated with fuel combustion (e.g., CO_2/t).

The Project Activity Emissions are:

PE= (3,846 tonnes/year) * (2.465 t CO_2/ton)
PE= 9,481 tCO_2 year

Table E.1 . Data used for the calculation of the estimated Project Activity Emissions:

Variable	Data Source	Value
Calorific Value Coal (*CVc*)	Sappi	26.6 TJ/kilotonne
Coal CO_2 Emission Factor (*EF_Co*)	IPCC	2.465 t CO2/ton
Required energy content of steam *(Se)*	Sappi	2788 kj/kg
Steam required in project scenario via coal *(Sr_p)*	Sappi	31,198 (t/year)
New Boiler Efficiency (*Be_p*)	Babcock	85%

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

According to Appendix B, I.C., paragraph 8, leakage is to be considered only if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity. Since there is no transfer in this project, there are no sources of leakage expected from the project.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>>

9, 481 tCO_2 are the annual small-scale project activity emissions.

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>

Baseline emissions from steam generation using historical data

For steam generation, I.C. paragraph 5 states:

"For renewable energy technologies that displace technologies using fossil fuels, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times and emissions coefficient for the fossil fuel displaced. IPCC default values for emission coefficients may be used."

As the fuel switch project uses biomass as a source of energy for steam generation used, the baseline emissions are calculated based on the amount of coal that would have been required for the production of steam.

The formula used to calculate the amount of energy required for the amount of steam produced in the baseline is:

(4) $Er_b = St_b * (Se/Eb_b)$

Where:

Er_b= the quantity of energy required to produce the estimated amount of steam per year (in TJ/year).
St_b= the total estimated steam produced in the baseline (t/year)
Se= the energy content of the steam required (kj/kg)
Eb_b= the efficiency of the original boiler

Amount of energy required:

Er_b = (227,632 t/year) * (2788 kj/kg)/ (0.72)
Er_b = 881.3 TJ/year

The formula used to calculate the quantity of coal used in the baseline scenario:

(5) $Co_b = Er_b/CVc$

Where:

Co_b= the quantity of Coal used in the baseline (in tonnes) per year.
Er_b= the quantity of energy required to produce the estimated amount of steam per year (in TJ/year).
CVc = the net calorific value of coal utilised in the baseline (in TJ/kilotonne).

The quantity of coal used in the baseline scenario:

Co_b= (881.3 TJ/year) / (26.6 TJ/kilotonne)
Co_b= 33.13 kilotonne/year
Co_b= 33,132 tonnes/year

The formula used to calculate the Baseline Emissions is:

(6) PE = Co * EF_Co

Where:

BE = the Baseline Emissions (in t CO_2/year)
Co_b= the quantity of Coal used in the baseline scenario (in tonnes) per year.
EF_C = the CO_2 emission factor per unit of coal associated with fuel combustion (e.g., CO_2/t).

The Baseline Emissions are:

BE= (33,132 tonnes/year) * (2.465 t CO_2/ton)
BE= 81,671 tCO_2 year

Table E.2. Data used for the calculation of the Baseline Activity Emissions:

Variable	Data Source	Value
Calorific Value Coal (*CVc*)	Sappi	26.6 TJ/kilotonne
Coal CO_2 Emission Factor (*EF_Co*)	IPCC	2.465 t CO2/ton
Total estimated steam produced in the baseline(St_b)	Sappi	227,632 t/year
Required energy content of steam *(Se)*	Sappi	2788 kj/kg
Old Boiler Efficiency (Be_b)	Steinmuller	72%

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>
The formula used to estimate the Emission Reduction is:

(7) ER = BE – PE

Where:

ER = Emission reduction (tonnes of CO_2e)
BE = Baseline emissions (tonnes of CO_2e)
PE = Project activity emissions (tonnes of CO_2e)

ER = 81,671 – 9, 481
ER = 72,189 t CO_2 annually

E.2 Table providing values obtained when applying formulae above:

>>

Table E.3. Summary of Baseline Emissions, Project Emissions, and Emission Reductions.

Year	Baseline Emissions (t CO_2 /year)	Project Emissions (t CO_2 /year)	Emission Reductions (t CO_2 /year)
2007	81,671	9,481	72,189
2008	81,671	9,481	72,189
2009	81,671	9,481	72,189
2010	81,671	9,481	72,189
2011	81,671	9,481	72,189
2012	81,671	9,481	72,189
2013	81,671	9,481	72,189
Total (tonnes of CO_{2e})	**571,697**	**66,367**	**505,323**

SECTION F.: Environmental impacts:

F.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

An EIA was completed and a Record of Decision (ROD) obtained approving project to go ahead. EIA/4202 from Department of Agriculture & Environmental Affairs (KZN) dated 12 March 2004.

SECTION G. Stakeholders' comments:

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

>>

Annex 3 contains additional information regarding stakeholders' consultation the list of participants. Sappi addressed stakeholders via the independent community liaison forum (Simunye Forum) run under the auspices of the Ndondakasuka Municipality. The stakeholders have been part of an ongoing process or regular meetings covering a number of issues relevant to the local community. The number 10 boiler conversion has been presented as a CDM project as long ago as 2003, when the original EIA comments were required. Prior to this project, presentations were made on CDM and GHG emissions to the forum. An electronic communication was circulated specifically around the CDM project on the number 10 boiler conversion to the stakeholders in February 2006. A meeting was also held with the other major stakeholder, Mr Henk Kapp, Interwaste site contract manager regarding their involvement and the potential effects of the project. This stakeholder was also positive in response to the project.

G.2. Summary of the comments received:

>>

The stakeholders did not raise any major concerns or objections. A summary of the local stakeholders is included in the additional information regarding stakeholders' consultation, attached as Annex 3. The stakeholders all supported Sappi in being proactive in its early adoption of CDM in South Africa and attempt to improve the environment.

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

>>

As stated under G.2 the stakeholders raised no major concerns or objections. The answers provided by Sappi and EcoSecurities in relation to impacts and complying issues satisfied the participants.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

- - - -

This project will not receive any public funding.

Annex 3

STAKEHOLDER CONSULTATION

lders consulted during the preparation of this document.

ironmental Action Committee – Contact Details

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