Clean Development Mechanism South Africa
Designated National Authority

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

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# Project Design Document (PDD)

| | |
|---|---|
| Project reference number (office | |
| Date received (office use only) | |

**NOTES ON COMPLETING THIS PROJECT DESIGN DOCUMENT**

1. Please provide this PDD in both hard-copy (one copy) and electronic formats (MSWord)
2. The information submitted to the DNA in this PIN will remain confidential.
3. Please ensure that all fields are filled in as far as possible to allow for proper consideration of the proposed project.

## Part A: Project Proponent Details

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|---|---|
| **Project Name** | Waste energy to electricity at ArcelorMittal's Vanderbijlpark Steel, South Africa |
| **Date of Submission of PDD** | 12 April 2012 |

| **Project Developer** | |
|---|---|
| **Name** | ArcelorMittal South Africa Limited (AMSA) |
| **Organizational Category** | Private company |
| **Legal Status** | Limited company |
| **Street Address** | Delfos Boulevard<br>Vanderbijlpark<br>P.O. Box 10202 |

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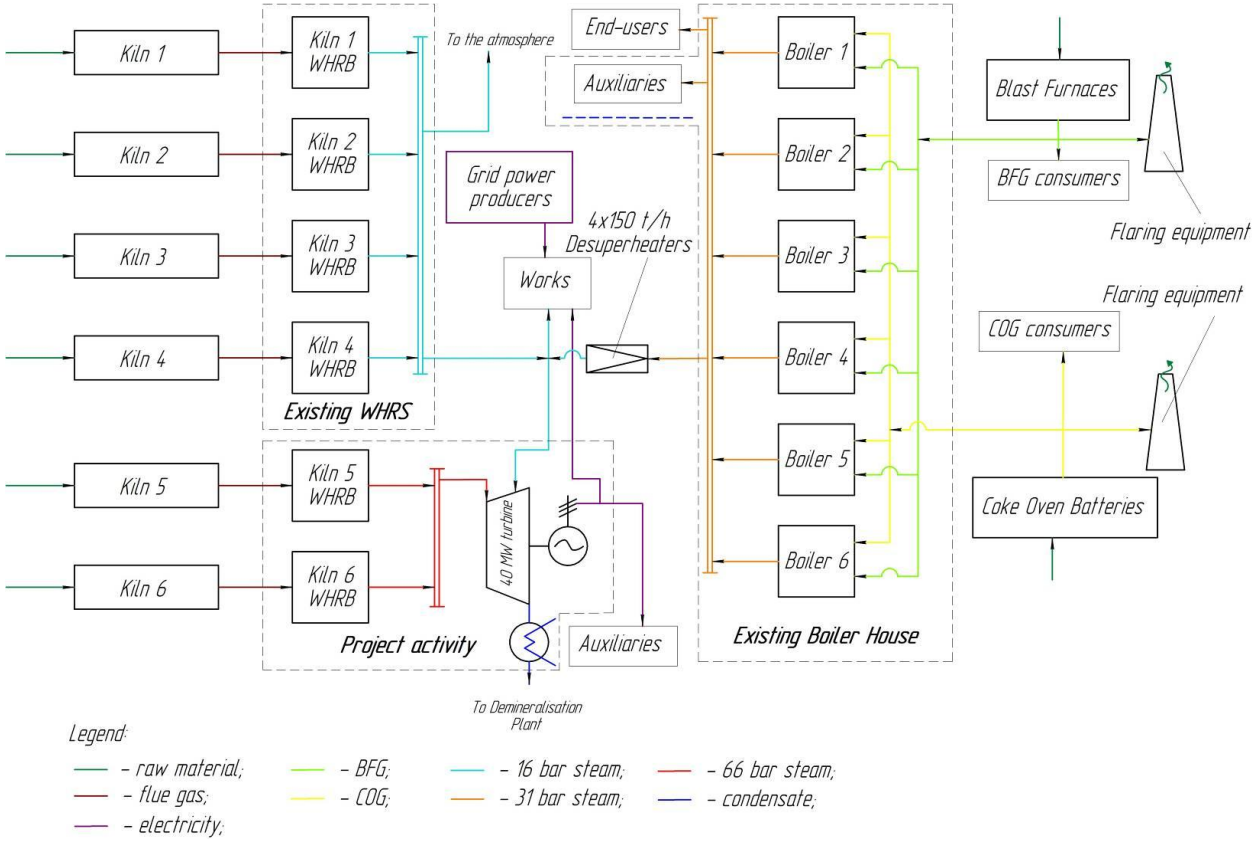
|---|---|
| | South Africa |
| **Postal Address (if different from above)** | |
| **Website Address** | www.arcelormittalsa.com |
| **Main Activities** | AMSA is the largest steel producer on the African continent. It is the leader in the supply of steel to all major global markets, including automotive, construction, household appliances and packaging, with leading R&D and technology, as well as sizeable captive supplies of raw materials and outstanding distribution networks. |
| **Summary of Financial Performance in last fiscal year** | Headline earning: R1377Million, EBITDA margin 12%, REQ: 6.2%, asset value: R 31718Million. |
| **Contact Person(s)** | Alexander Churilov |
| **Telephone** | Cell: +33 (0) 6 10 45 47 17 |
| **Fax** | +33 (0) 1 71 92 25 26 |
| **Email Address** | alex.churilov@arcelormittal.com |
| **Project Partners**<br>Provide the following Information for **all** project partners (copy and paste relevant sections of the table if information is to be provided on more than one partner organisation) | |
| **Name** | Blue World Carbon Asset Management (Pty) Ltd (BWC) |
| **Nature of partner** | Carbon consultant |
| **Organizational Category** | Private Company |
| **Legal Status (if private company)** | Limited company |
| **Street Address** | Suite 101, Block A<br>7 West Quay Road<br>V&A Marina<br>Cape Town, 8001<br>Republic of South Africa |
| **Postal Address (if different to Street Address)** | |
| **Website Address** | www.blueworldcarbon.com |
| **Main Activities** | BWC is a leading international company that specializes in developing solutions and rendering professional services in the sphere of climate change, greenhouse gas management and energy consulting. |
| **Contact Person(s)** | Joost van Lier<br>Managing Director, South Africa |
| **Telephone** | Work: +27 (0) 82 607 1440<br>Cell: +27 (0)71 609 2276 |

| | |
|---|---|
| **Fax** | +27 (0) 71 609 2276 |
| **Email Address** | joost.van.lier@blueworldcarbon.com |
| **Contractual Arrangements** | |
| **Contractual arrangements between various entities involved** | The project was developed by AMSA which runs the energy facility. BWC is a carbon consultant which is developing all necessary documentation for project approval by the CDM Executive Board and selling GHG emission reductions in the international market. |

# Part B: Project Overview (Technical Summary, Location and Schedule)

| **Technical Summary of the project** | |
|---|---|
| **Objective of the Project** | The aim of the project is to generate electricity for internal purpose of Vanderbijlpark (VDBP) Works, reducing the demand for electricity supplied by Eskom. |
| **Project Description**<br><br>The project development envisages the construction and operation of a new Waste Energy Recovery System (WERS) which consists of the Waste Heat Recovery System (WHRS) of the two new Direct Reduction (DR) Kilns as well as the Power Plant with an installed power capacity of 40 MW that utilizes waste energy from the Waste Energy Carrying Medium (WECM) streams for electricity generation only. The electricity generated by the new WERS is used for internal purposes of VDBP Works, reducing the demand for electricity supplied by Eskom.<br><br>The principal components of the project see below. | |

## Technical Summary of the project




WERS utilizes waste energy from the following WECM streams for electricity generation:

- Flue gas from the new DR Kilns 5 and 6;
- Excess low-pressure steam from the existing WHRS of the DR Kilns 1-4;
- Excess Blast Furnace Gas from the existing Blast Furnaces C and D; and
- Excess Coke Oven Gas from the existing Coke Oven Batteries.

The flue gas from DR Kilns 5 and 6 is fed into After Burning Chambers and then passes through the Waste Heat Recovery Boilers (WHRB) to generate high-pressure steam (66 bar) which then is transferred to the steam turbine.

The steam turbine is also fed with excess low-pressure steam from the existing WHRS of the DR Kilns 1-4 as well as steam generated at the existing boiler house by burning excess Coke Oven Gas and Blast Furnace Gas and throttled via four Desuperheaters.

**Project Constraints**

The power plant operation will be dependent of the plant availability.

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| **Technology to be employed** | The technology is based on the generation of steam from the waste energy. The steam is in turn used to generate power in the steam turbine.<br><br>This technology is well known; but it has not been used in South Africa.<br><br>Since AMSA are the project developer and operator and since it is new to South Africa, they have not had previous experience with operating this technology. |

<table>
<tr><th colspan="2">Technical Summary of the project</th></tr>
<tr><td>Greenhouse Gases Targeted</td><td>Implementation of the project will lead to reduction of greenhouse gas (GHG) emissions from combustion of fossil fuel for electricity generation. The principal GHG released during combustion of fossil fuel is $CO_2$. Emissions of $CH_4$ and $N_2O$ from combustion of fossil fuel are negligibly small as compared with $CO_2$ emissions and excluded for simplification.</td></tr>
<tr><td>Emission reductions</td><td>The total emission reductions at the end of the 10-year crediting period is expected to be 2 529 250 t $CO_2$e, as indicated in the following table:
<table>
<tr><th>Year</th><th>Volume, t $CO_2$e</th></tr>
<tr><td>2012 (from the 1st of July to the 31st of December)</td><td>126 462</td></tr>
<tr><td>2013</td><td>252 925</td></tr>
<tr><td>2014</td><td>252 925</td></tr>
<tr><td>2015</td><td>252 925</td></tr>
<tr><td>2016</td><td>252 925</td></tr>
<tr><td>2017</td><td>252 925</td></tr>
<tr><td>2018</td><td>252 925</td></tr>
<tr><td>2019</td><td>252 925</td></tr>
<tr><td>2020</td><td>252 925</td></tr>
<tr><td>2021</td><td>252 925</td></tr>
<tr><td>2022 (from the 1st of January to the 30st of June)</td><td>126 463</td></tr>
</table></td></tr>
<tr><td>Baseline & Additionality Assessment</td><td>Approved consolidated baseline and monitoring methodology ACM0012 “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects” (Version 04.0.0) is applicable to the project activity.<br><br>‘‘Tool for the demonstration and assessment of additionality” (Version 06.0.0) is used to demonstrate and assess the additionality of the proposed project activity.<br><br>The main emphasis is made on an investment analysis and a common practice analysis. The project is additional as defined under the Kyoto Protocol because of the following key factors:<br><br>• Project NPV, based on the investment comparison analysis, without the CDM are below the NPV of the baseline;<br>• The project is the first-of-its-kind in the Republic of South Africa.</td></tr>
<tr><td>Monitoring</td><td>The monitoring plan is devised as per approved consolidated baseline and monitoring methodology ACM0012 “Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects” (Version 04.0.0).</td></tr>
</table>

| Technical Summary of the project | |
|---|---|
| | The parameters to be monitored are:<br>• $EG_{grid,RF,y}$ - The quantity of electricity supplied to the recipient facility by generator, which in the absence of the project activity would have been sourced from the grid during the year y<br>• $EC_{PJ,y}$ - Additional electricity consumed in year y as a result of the implementation of the project activity<br>• $Q_{OE,y}$ - Quantity of actual intermediate energy generated during year y |
| **Type of project/activities** | Energy Demand |
| a. Energy Supply | N/A |
| b. Energy Demand | Replacement of electricity supply from the grid.<br>The project is aimed at waste energy recovery for power generation. Produced electricity is used within the VDBP Works thus substituting electricity supply from the grid. |
| c. Industrial Process | N/A |
| d. Transport | N/A |
| e. Waste Management | N/A |
| f. Forestry/ land use | N/A |
| g. Other | N/A |

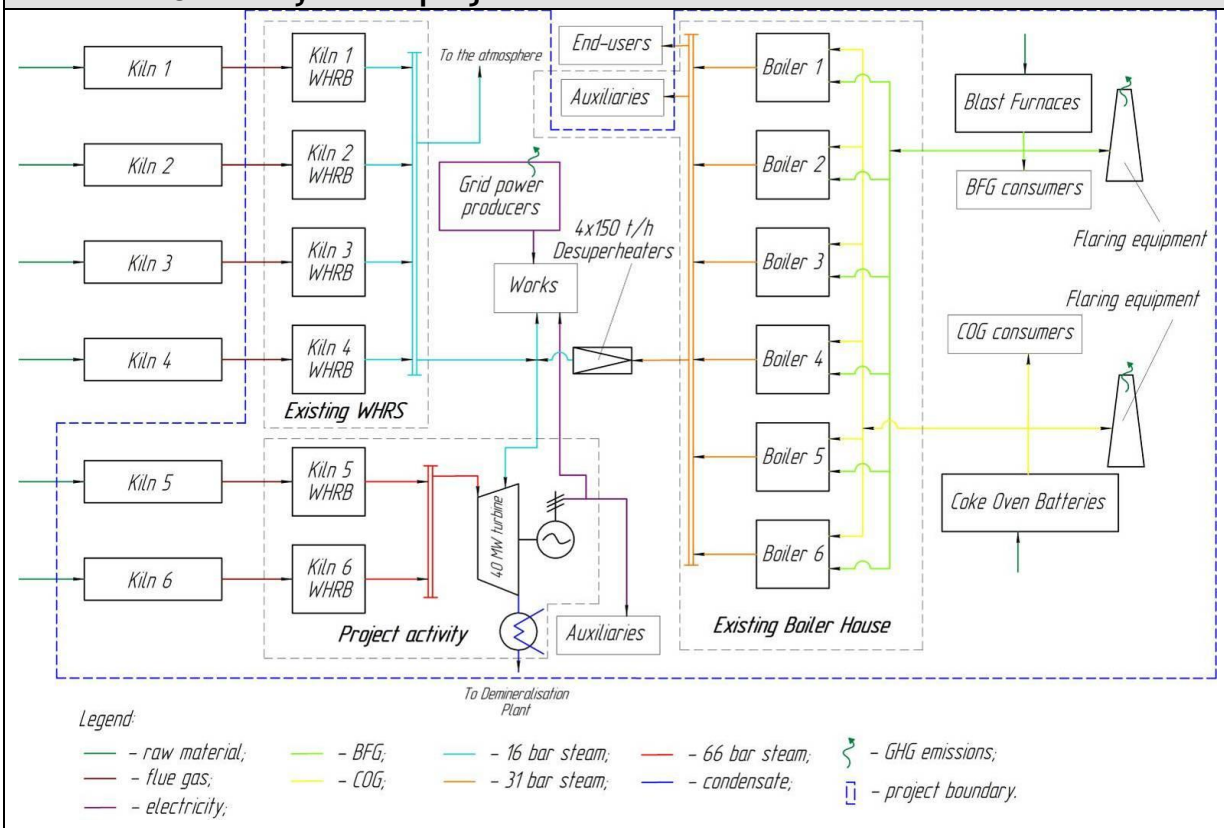
**Project Boundary**

According to ACM0012, the geographical extent project boundary shall include the relevant WECM streams, equipment and energy distribution system in the following facilities:

- The Project Facility; and
- The Recipient Facility.

The spatial extent of the grid is as defined in the "Tool to calculate the emission factor for an electricity system".

The figure below shows the principal components and the boundary of the project.

| Technical Summary of the project | |
|---|---|
|  | |
| Indicate Emissions outside the Project Boundary | N/A |

| Location of the Project | |
|---|---|
| **Province** | Gauteng Province |
| **Municipality** | Emfuleni Local Municipality |
| **Nearest city/large town** | Vanderbijlpark |
| **Brief description of the location of the project site** | The proposed project is located on the territory of VDBP Works north of the town of Vanderbijlpark and immediately east of the Golden Highway (R553). The property is located off Delfos Boulevard, on the remaining extent of Portion 1 of the farm Vanderbijlpark 550 IQ, in the NW7 industrial area.<br>The GPS coordinates: 26° 39' S and 27° 48' E |

| Project Schedule/Timetable | |
|---|---|
| **Earliest Project Start Date** | 03/2007 (start of construction and installation works)<br>07/2009 (start of operation) |
| **When is the expected first year of CER delivery** | 2013 |
| **Project Lifetime** | 25 years |

| Project Schedule/Timetable | |
|---|---|
| **Project End Date** | 07/2034 |
| **Crediting Period** | 10 year crediting period has been identified for the project. |
| **Current Status or phase of the project** | EIR was submitted to the Department of Environmental Affairs for an approval.<br>Record of Decision (RoD) was received.<br>Project Design Document (PDD) was made by Blue World Carbon. |
| **DNA Approval** | The project has not been previously submitted to the DNA for approval. |
| **Approval by other bodies** | The project (or any elements of the project) has not been submitted to any other national, provincial or local government departments or agencies for regulatory or legal approval (excluding EIA process – see Part C). |

# Part C: Performance Against the DNA's Sustainable Development Criteria

South Africa has identified the following sustainable development criteria and indicators against which each CDM project will be assessed. Please provide your interpretation of how this project will address each of these **criteria and indicators** where they are relevant to the project. If the space provided is not sufficient please append additional information as required.

**NOTE: For all indicators which are of relevance to the project show how the performance of the project against these indicators can be objectively monitored and measured on an ongoing basis.**

**1. Economic: Does the project contribute to national economic development?**

Yes. Once fully operational, the plant generates 40 MW of electricity. This means that VDBP Works is less reliant on traditional power sources, cutting its power costs and thereby increasing its profitability.

If the project is successful it will lead to the implementation of similar projects within other large companies resulting in a further reduction in the demand for electricity from the grid and similarly increase the profitability of other companies. The construction, running and maintenance of the new plant provides employment opportunities. The implementation of the project assists South Africa in reducing its total carbon emissions.

**2. Social: Does the project contribute to social development in South Africa?**

Yes. The project has resulted in job creation of 600 000 man-hours during the construction phase and 50 jobs during the operation phase of the plant.

The project is introducing a new technology that has never been used in South Africa. This is lead to developing expertise in an advanced field of power generation.

**3. Environmental: Does the project conform to the National Environmental Management Act principles of sustainable development?**

Please provide **brief** comment for each of these below.

| | |
|---|---|
| i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied | The project is not expected to disturb the ecosystem or cause the loss of biological diversity. The project was implemented on an already existing industrial site. |
| ii) That **pollution and degradation of the environment** are avoided, or where they | The project is not polluting the environment. The electricity is produced with a waste heat sources offsetting the need to burn fossil fuels. Thus |

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| cannot be altogether avoided, are minimised and remedied | $CO_2$ emissions are reduced. |
| iii) That the **disturbance of landscapes and sites that constitute the nation's cultural heritage** is avoided, or where it cannot be altogether avoided, is minimised and remedied | No disturbance of landscapes and sites that constitute the nation's cultural heritage will occur. The project was implemented on an already existing industrial site |
| iv) That **waste is avoided**, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner | The project has not resulted in any changes to waste management, besides the recovery of waste gases heat. |
| v) That **the use and exploitation of non-renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource | The water stream used in the scheme is continuously recycled to minimise water usage. |
| vi) That the **development, use and exploitation of renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource. | There are no renewable resources used in this project. |
| vii) That **a risk averse and cautious approach** is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions | The technology implemented in this project has been tested and utilised overseas successfully numerous times. |
| vii) That **negative impacts on the environment and on people's environmental rights** be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied | The plant is located within the AMSA site and all rules and regulations relating to AMSA operational permit and bylaw is adhered to.<br>The project results in mitigation of negative environmental impacts. It leads to a reduction in fossil fuel emissions, thereby reducing the release of harmful gases into the environment such as carbon dioxide, flue ash, oxides of sulphur and nitrogen. |
| **Other comments**<br>**Please provide any other comments on how this project contributes to sustainable development in South Africa (**optional)<br>With an increase in power shortages, climate change and electricity demand, the need for improvements in energy efficiency is gathering momentum in both developed and emerging economies. Most of South Africa's electricity is generated through the combustion of fossil fuels. This is not a sustainable form of electricity. Through the implementation of the WERS, cleaner energy is produced, not only reducing the demand for electricity from the grid but also meeting environmental requirements. In addition, the project provides employment opportunities and contributes to South Africa's aim to reduce GHG emissions. | |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Environmental** | Impact on local environmental quality | • Impact of the project on air quality<br>• Impact of the project on water pollution<br>• Impact of the project on the generation or disposal of solid waste<br>• Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic) | The project does not impact local environment quality.<br>Air quality is improved as the project leads to a decrease in fossil fuel combustion at grid power plants. The project does not result in the pollution of water sources and no solid waste is produced. |
| | Change in usage of natural resources | • Impact of the project on community access to natural resources<br>• Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources<br>• Impact of the project on the efficiency of resource utilisation | No impact on community access to natural resource takes place since the project is located on an already existing industrial site.<br>The project leads to the mitigation of fossil fuels. |
| | Impacts on biodiversity and ecosystems | • Changes in local or regional biodiversity arising from the project | The project is located on an already existing industrial site, thus no change in local or regional biodiversity arise. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Economic** | Economic impacts | • Impact of the project on foreign exchange requirements<br>• Impact of the project on existing economic activity in the area<br>• Impact of the project on the cost of energy<br>• Impact of the project on foreign direct investment | Equipment needed to construct the plant was sources from overseas suppliers. Thus it impacts foreign exchange requirements.<br>The project has resulted in job creation of 600 000 man-hours during the construction phase and 50 jobs during the operation phase of the plant.<br>The implemenation of the project reduces the need for electrcity from the grid and AMSA might sell additional energy to the grid. In the long run, if other industry implemented similar technologies, this could help stabilize electrcity prices. |
| | Appropriate technology transfer | • Positive or negative implications for the transfer of technology to South Africa arising from the project<br>• Impacts of the project on local skills development<br>• Demonstration and replication potential of the project | There is an increase in skilled labour requirements as the equipment was imported. Workers are exposed to a new technology and this is allowing them to develop skills particularly in the engineering and maintenance sectors. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Social** | Alignment with national provincial and local development priorities | • How the project is aligned with provincial and national government objectives<br>• How the project is aligned with local developmental objectives<br>• Impact of the project on the provision of, or access to, basic services to the area<br>• Impact of the project on the relocation of communities if applicable<br>• Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets) | The project encourages the development of waste gas recovery programmes to produce electrcity and promotes the reduction of fossil fuel combustion. It also leads to the decrease in demand for electrcity from the National Grid.<br>The project results in job creation of 600 000 man-hours during the construction phase and 50 jobs during the operation phase of the plant.<br>The project does not impact negatively on any local industries as the plant will be built on an existing industion site.<br>This project does no impact of the basic services in the area and has not caused the relocation of communities.<br>The project assists in achieving South Africa's goal of reducing GHG emissions below the current emissions baseline of 42% of 2025. In addition, it assists ArcelorMittal in achieving their goal to reduce their $CO_2$ emissions by 8% by 2020. |
| | Social equity and poverty alleviation | • Impact of the project on employment levels? (specify the number of jobs created/lost; the duration of time employed, distribution of employment opportunities, types of employment, categories of employment changes in terms of skill levels and gender and racial equity)<br>• Impact of the project on community social structures<br>• Impact of the project on social heritage<br>• Impact of the project on the provision of social amenities to the community in which the project is situated<br>• Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes | The project has a positive and beneficial effect on employment levels. The project results in job creation of 600 000 man-hours during the construction phase and 50 jobs during the operation phase of the plant.<br>Since the project was implemented on an already existing industrial site, there is no impact on the community social structure, the social heritage or the provision of social amenities to the community; other than during the construction phase when more jobs was created. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **General** | General Project Acceptability | • Are the distribution of project benefits deemed to be reasonable and fair? | The distribution of the project benefits is deemed to be reasonable and fair because they contribute to technological development of the country, have a positive effect on the environment and lead to an increase in employment level. |

## Part D: Finance

| **Project Costs** | |
|---|---|
| **Development Costs (R's )** | N/A |
| **Installed Costs (R's)** | N/A |
| **Other Costs (R's)** | N/A |
| **Total Project Costs (R's)** | 246.61 million ZAR |
| **Sources of Finance** | |
| **Equity** | N/A |
| **Debt** (long term) | N/A |
| **Debt** (short term) | N/A |
| **Amount not identified (R's)** | N/A |
| **Total CDM Contribution sought** | N/A |
| **Expected Price of CER** in case of a contract to purchase for:<br>A period of 7 years<br>A period of 10 years<br>A period of 14 years (2x7 years) | In case of a contract to purchase for a period of 10 years expected price of CER is 100÷150 ZAR/$tCO_2$ |
| Indicate the **projected Internal Rate of Return** for the project with and without CER revenues. | N/A |
| **Constraints on tradability of carbon credits** | No constraints as yet |
| **Preliminary discussions with potential purchasers** | Preliminary discussions have not taken place. |