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 use only)	
Date received (office use only)	
NOTES ON COMPLETING THIS PROJECT DESIGN DOCUMENT 1. Please provide this PDD in both hard-copy	

Part A: Project Proponent Details

Project Name	Distributed Energy Generation's Waste Heat to Power Project at XAWO
Date of Submission of PDD	04 September 2012

Project Developer	
Name	Distributed Energy Generation (Pty) Ltd (DEG)
Organizational Category	Private Company
Legal Status	Privately held company
Street Address	1 MARTHAS VINEYARD 44 MANDEVILLE ROAD BRYANSTON Gauteng 2191
Postal Address (if different from above)	P O BOX 68843 BRYANSTON Gauteng 2021
Website Address	None
Main Activities	Clean energy project development
Summary of Financial Performance in last fiscal year	DEG is a newly incorporated company. No financial statements prepared to date.
Contact Person(s)	Nico Smith

Telephone	+27 83 261 3316
Fax	+27 86 723 7162
Email Address	nico@degpl.com

Project Partners 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	XSTRATA SOUTH AFRICA PROPRIETARY LIMITED
Nature of partner	Xstrata owns and operates the furnaces at its Wonderkop Operations (XAWO) where hot the gas is emitted from which heat will be extracted for power generation
Organizational Category	Private company
Legal Status (if private company)	Private company
Street Address	3rd Floor 23 Melrose Arch Melrose North 2196
Postal Address (if different to Street Address)	Private Bag 82325 Rustenburg 0300
Website Address	www.xstrata.com
Main Activities	Mining and smelting (Chrome, Platinum, Vanadium and Coal)
Contact Person(s)	Miss Amanda Magro
Telephone	+27 14 572 0061
Fax	+27 86 601 6410
Email Address	amagro@xstrata.co.za

Project Partners	
Name	CDM Africa Climate Solutions (Pty) Ltd
Nature of partner	CDM Africa is DEG's project partner for the XAWO energy recovery project from commencement of the CDM process to the first successful registration of the project with the CDM Executive Board.
Organizational Category	Private Company
Legal Status (if private company)	Limited company
Street Address	83 MacKay, Blairgowrie Johannesburg South Africa
Postal Address (if different to Street Address)	83 MacKay, Blairgowrie Johannesburg South Africa
Website Address	http://www.cdmafrica.com/
Main Activities	CDM Africa's understanding of the carbon market structure and design, regulatory incentives and the economic instruments relevant to the policies in question can form a key component of industry strategies for developing the potential of additional income for small and large capital projects. We assist project developers analyze the marginal costs or

	benefits of emissions reductions, determine optimal allocation mechanisms, examine program design issues, assess market position as a buyer or seller and design trading strategies.
Contact Person(s)	Name: Ciska Terblanche
Telephone	Cell: +27 (0)82 898 5750
Fax	0866908482
Email Address	Ciska@cdmafrica.com

Contractual Arrangements	
Contractual arrangements between various entities involved	Letter of intent issued by Xstrata Alloys – 20111117 Signed PPA Term Sheet – 20120622 PPA under development for submission to Xstrata Board

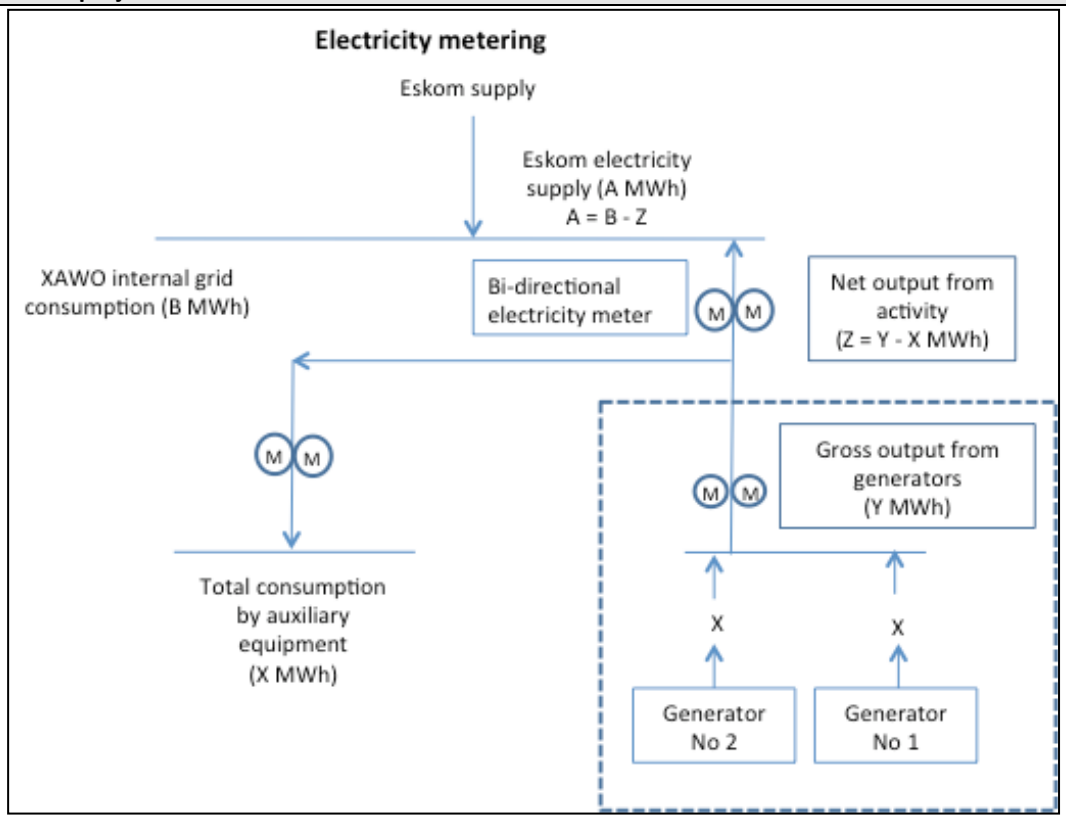
Part B: Project Overview (Technical Summary, Location and Schedule)

Technical Summary of the project	
Objective of the Project	Purpose of the project activity The proposed project activity is an initiative to recover waste heat from waste gas from six existing semi-closed type ferrochrome furnaces at XAWO and generate electricity. The electricity will be for captive use by XAWO and will reduce XAWO's demand for Eskom generated electricity.
Project Description The envisaged project will divert the waste heat to an Organic Rankine Cycle (ORC) facility, which will convert low grade heat into usable electrical energy, with a maximum rated output capacity (MRC) of 35.8MW[1]. The project will generate an expected net total of 222 875MWh of electricity per annum. All of this electricity will be used by XAWO on site. XAWO will therefore reduce the amount of electricity purchased from Eskom.	
Project Constraints Are there any constraints affecting project operations or commissioning? *(Brief description: 1 paragraph or less)* *Note: these may be due to energy supply, infrastructure, other resources etc.* The project operates under a number of constraints: The project is reliant on the activity of the XAWO smelter furnaces which is the source of heat. If furnaces are not in operation for whatever reason or operated at reduced output the project operations will reduce in proportion to the reduction in activity of furnaces. **Prevailing practice**: The project activity is the first of its kind. As of 9 August 2012, no heat recovery on semi-closed ferrochrome furnaces are implemented with an organic rankine cycle technology of any capacity to generate electricity in South Africa or any other country in the world. Internationally, it is confirmed that the ORC technology has not been applied in the ferrochrome sector[2].	
Technology to be employed	The technology used to generate the electricity will be sourced from Ormat Technologies Inc. in Israel and will be imported to South Africa. The technology is a mature technology that is applied extensively internationally, although not in the ferrochrome industry.
Greenhouse	*Identify which greenhouse gas(es) this project will target.*

[1] Appendix 10 Equipment specification sheet

[2] Appendix 3_Letter from Ormat, 7 February 2012

Technical Summary of the project	
Gases Targeted	CO_2
Emission reductions	Average over one year: 247,064 tonnes CO_2e Total over 10 years: 2,470,640 tonnes CO_2e
Baseline & Additionality Assessment	**Methodology Applied:** 1. Approved consolidated baseline and monitoring methodology ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects", Version 4.0.0. **This methodology also refers to the latest approved versions of the following tools**: 2. "Tool to calculate the emission factor for an electricity system", Version 02.2.1; 3. "Tool for the demonstration and assessment of additionality", Version 06; 4. "Tool to determine the remaining lifetime of equipment", Version 01; Baseline: The development of the project is based on ACM0012. The baseline emission (BE) is calculated from the electricity generated by the project. **Additionality** Additionality: The financial assessment will be conducted according to the procedures described in ACM0012.
Monitoring	Electricity meters will measure the quantity of electricity supplied to XAWO. These meters are 4-quadrant billable class meters that are bi-directional – this means that they subtract any electricity used by the plant during start up, or when the plant is not producing electricity. (i) Data to be monitored during the crediting period The following data will be monitored by DEG: • Gross quantity of electricity from the generator terminals; • Electricity consumption of auxiliary equipment in use by the project activity during start-up and operation. • Net electricity supplied to XAWO being the difference between the above gross output from generator terminals and the usage of auxiliary equipment of the project activity. (ii) Equipment Two bi-directional electricity meters will be installed on the electrical feeds to XAWO – one main meter and one check meter. The metering configuration is illustrated in **Figure 1** below. **Figure 1: Electricity meters layout for the power plant supplying electricity to XAWO**

Technical Summary of the project	
	 For more detail please refer to Section 7 of the PDD.
Type of project/activities	*Identify which type of activity is involved in this project – and for each, provide brief details*
a. Energy Supply	The generation of electricity from waste heat
b. Energy Demand	*NA*
c. Industrial Process	*NA*
d. Transport	*NA*
e. Waste Management	*NA*
f. Forestry/ land use	*NA*
g. Other	*NA*
Project Boundary The project boundary is the physical boundary of the site and the power stations making up the South African grid.	
Indicate Emissions outside the Project Boundary	There are no net emissions attributable to the proposed project activity outside the project boundary.

Location of the Project	
Province	North-West province

Municipality	Rustenburg
Nearest city/large town	Rustenburg
Brief description of the location of the project site	GPS coordinates for the site (location of Furnace number 1): 25˚42'50.57" S 27˚24'12.66" E **Figure 2: Location of XAWO** 

Project Schedule/Timetable	
Earliest Project Start Date	November 2012 The starting date for the project activity is when the first deposit is paid or when a contract is signed with the equipment supplier to provide the equipment. Commissioning is expected to take place 24 to 27 months after start date.
When is the expected first year of CER delivery	One year after commissioning of the project (2014)
Project Lifetime	20 years
Project End Date	According to CDM, 10 years after commissioning, 2024
Crediting Period	10 years
Current Status or phase of the project	Feasibility Study
DNA Approval	
Approval by other bodies	The project was approved by the Department of Environment and a Record of Decision was issued on 28 February 2012. The environmental impact assessment (EIA) for the proposed facility has

Project Schedule/Timetable	
	been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). No environmental fatal flaws were identified to be associated with the proposed energy facility.

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?

The project will contribute to the much needed expansion in electricity generation capacity. This will have a positive impact on the short term availability of electricity on the national grid.

The generation of electricity from renewable energy resources offers a number of socio-economic benefits to South Africa as identified in the Environmental Impact Assessment conducted:

- Increased energy security
- Resource saving (coal)
- Exploitation of a renewable energy resource
- Climate friendly development
- Employment creation
- Support to new industry sector

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

Yes, the project contributes to the social development of South Africa in a number of ways:

- The project is strongly aligned with Government's developmental agenda with respect to alternative energy targets. This project will generate electricity from energy which has previously simply been vented into the air as waste.
- Job creation: The construction phase will at peak employ approximately 577 people during the construction period. The proposed power plant will employ approximately 10 full time employees and, as such, will create potential employment opportunities in the province[3].
- The ferrochrome industry is very cyclical in nature. Over the past decade XAWO has been forced to shut down sections of its operation due to low ferrochrome prices or demand on a number of occasions. In such times the job security of the workers on the plant is very low. The implementation of this project will make a positive contribution towards the profitably of the company, and therefore have a positive impact on the job security of the workers.

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**	Yes, the disturbance of ecosystems and loss of biodiversity are avoided.

[3] EIA Report, page 339.

and loss of biological diversity are avoided, or where they cannot be avoided, are minimised and remedied	The project will be implemented on a heavy industrial site. The project will have no additional impacts over and above the impacts already on site.
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied	Yes, pollution and degradation of the environment are avoided. The current flue gas bag filters will remain in use to ensure the plant remains within the required legal limits with regards to its environmental emissions.
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	Yes, the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided as the project will be implemented on and within the boundaries of an existing heavy 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	Yes, waste is avoided. The main aim of the project is to utilise waste energy in the production of electricity. The technology selected does not require any additional water for operational requirements while it is also a technology with zero emissions.
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 project impacts positively on the exploitation of non-renewable resources by Eskom in the generation of electricity in the sense that for each 1MW of electricity generated, it enables Eskom to burn approximately 4,400 tons of coal per year less in future. As such, the exploitation of non-renewable resources is responsible and equitable.
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.	Yes, the development, use and exploitation of renewable resources are responsible and equitable as the main purpose of the project is to utilise existing waste energy in a positive and productive manner.
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	Yes, a risk averse and cautious approach is applied. Worker health and safety is one of the cornerstones of the design of the project.
viii) 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	An environmental impact assessment was done aimed at identifying and mitigating negative environmental impacts associated with the project. No negative impact was found and the Environmental Authorisation /Record of Decision was issued on 28 February 2012. In addition the CDM and EIA processes require a public stakeholder process, which was performed as part of the EIA process. Surrounding communities and stakeholders were actively encouraged to participate and contribute to the EIA and CDM. No objection to the implementation

	of the project was raised.
Other comments **Please provide any other comments on how this project contributes to sustainable development in South Africa (**optional)	

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Environmental	Impact on local environmental quality	• Impact of the project on air quality • Impact of the project on water pollution • Impact of the project on the generation or disposal of solid waste • Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic)	Due to the nature of the project - re-routing the waste heat, that is currently vented, through waste heat recovery equipment and electricity generation equipment - there are no significant changes to the impact on air or water quality. The project will utilise air cooled condensing units thus not requiring water for operation purposes. The project has a positive indirect impact on solid waste disposal due to reduced coal mining and reduced ash disposal associated with the Eskom power stations.
	Change in usage of natural resources	• Impact of the project on community access to natural resources • Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources • Impact of the project on the efficiency of resource utilisation	The project will have **NO IMPACT** on community access to natural resources. The project will have a **POSITIVE** impact on the sustainability of mineral resources as the consumption of coal by Eskom will be reduced. The project will have a **POSITIVE** impact on the efficiency of resource utilisation as it is designed to capture and utilise waste energy that would normally have been released into the atmosphere.
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	The project will have **NO IMPACT** on local or regional biodiversity.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Economic	Economic impacts	• Impact of the project on foreign exchange requirements • Impact of the project on existing economic activity in the area • Impact of the project on the cost of energy • Impact of the project on foreign direct investment	The project will raise funding for the capital on the open market. The carbon credits will generate foreign direct investment. The Organic Rankine Cycle technology will be bought from outside SA, this has a forex impact. Some maintenance costs will also be in foreign currency. This project will support economic development through the alleviation of the national grid as the current generation shortages negatively affect the local economy.
	Appropriate technology transfer	• Positive or negative implications for the transfer of technology to South Africa arising from the project • Impacts of the project on local skills development • Demonstration and replication potential of the project	This project will require technology import. The project will have a positive impact on the development of local skills as new power plant operators gain training and experience. The Organic Rankine Cycle technology is new to South Africa. Additional to the erection of to this plant, specialist maintenance personnel will be trained to maintain the facility and they will be able to offer their skills to successive plants with similar technology. Significant potential exist in South Africa for conversion of low grade waste heat to electricity. The implementation of the project will therefore serve as an example for other projects which could trigger replication.

Indicators in Support of the Project Approval Criteria		
Category	**Indicator**	**Comment**

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 • How the project is aligned with local developmental objectives • Impact of the project on the provision of, or access to, basic services to the area • Impact of the project on the relocation of communities if applicable • Contribution of the project to any specific sectorial objectives (for example, renewable energy targets)	Firstly, South African Government has recognised the country's high level of cleaner energy potential. This project supports this initiative. The electricity supply to the grid will increase and therefore will contribute to the provision of basic electricity supply services to the country as a whole. The project will contribute towards the provincial economy; create sustainable employment opportunities; enhance profitability; ensure sustainable development and poverty eradication - in line with both ASGI-SA and the Provincial Growth and Development Strategy (PGDS). There will be no impact in terms of relocation of communities. The project will positively impact on the provision of alternative energy to the country's national grid and will support the National Energy Regulator of South Africa's (NERSA's) objectives for the supply of electricity from renewable sources.
	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) • Impact of the project on community social structures • Impact of the project on social heritage • Impact of the project on the provision of social amenities to the community in which the project is situated • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes	Job creation: The proposed development represents an investment in waste energy to power generation, which, given the challenges created by climate change, represents positive social benefit for society as a whole. The key social issues associated with the construction phase include the creation of employment and the opportunity for skills development and training. During the construction period there will be job creation which is expected to reach 577 jobs opportunities at peak and once the project is implemented, at least 10 permanent employees will be employed. There will be no adverse impacts on community social structures, social heritage or the provision of social amenities. The project will have a positive impact on development of underdeveloped areas due to reducing the load shedding frequencies negatively impacting communities.

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?	Yes. The benefit of reliable power will be appreciated by the communities and local business in the area. The additional generation capacity will alleviate the electricity shortages being experienced by the South African grid. In addition, newly appointed plant operators will benefit from fair wages, training and experience. The entity operating the plant, which will be XEnergy, will comply with the labour law; ensuring fair wages will be paid.

Part D: Finance
Figure 3

Project Costs	
Capital Expenditure Costs (R's) Total Capital Expenditure (CAPEX) plus Mobilisation Cost	R 994 million
Other Costs (R's) Annual Operation and Maintenance Cost estimate*	R13.38m / year
Total Project Costs (R's)	R994 million Capital and ongoing R88 million yearly for maintenance etc.
Sources of Finance	
Equity	25%
Senior Debt (long term)	60%
Subordinated Debt (long term)	15%
Total CDM Contribution sought	247 064 x €5/ton.
Expected Price of CER in case of a contract to purchase for: A period of 7 years A period of 10 years A period of 14 years (2x7 years)	No contract exist at the moment. A 10 year crediting period is selected in the PDD and various models have been constructed. €5 €5 €5
Indicate the **projected Internal Rate of Return** for the project with and without CER revenues.	*Note: Please indicate assumed price of CER as used in your calculation* 10% real
Constraints on tradability of carbon credits	Have any commercial arrangements been made that may impact the tradability of the carbon emission reductions? If yes, please define. Note. Examples would be subjection to a mortgage, government tax etc. NA
Preliminary discussions with potential purchasers	Have you had any preliminary discussions with any potential purchasers of the carbon credits (CERs) No specific discussions have been held.