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

Part A: Project Proponent Details

Project Name	Neusberg Grid Connected Hydroelectric Power Plant, South Africa
Date of Submission of PDD	08/06/2012

Project Developer	
Name	Kakamas Hydro Electric Power (Pty) Ltd
Organizational Category	Private company
Legal Status	Limited company
Street Address	Office 301, Third floor Execujet Business Centre Tower Road Cape Town International Airport 7525 South Africa
Postal Address (if different from above)	P O Box 50 Cape Town International Airport 7525 South Africa

Website Address	www.mulilorenewableenergy.com
Main Activities	Development of renewable energy projects
Summary of Financial Performance in last fiscal year	Capital Expenditure phase, pre-award of PPA
Contact Person(s)	Niel Theron
Telephone	+27 (0) 21 934 5268
Fax	+27 (0)21 935 0505
Email Address	niel@mulilo.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	Blue World Carbon Asset Management (Pty) Ltd
Nature of partner	Carbon consultant
Organizational Category	Private company
Legal Status (if private company)	Limited company
Street Address	Suite 101, Block A 7 West Quay Road V&A Marina Cape Town, 8001 Republic of South Africa
Postal Address (if different to Street Address)	
Website Address	www.blueworldcarbon.com
Main Activities	Blue World Carbon (BWC) is the 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 (Managing Director, South Africa)
Telephone	Work1: 021 418 5368 Work2: +27 (0)82 607 1440 Cell: +27 (0)71 609 2276
Fax	+27 (0)86 609 2770
Email Address	joost.van.lier@blueworldcarbon.com
Contractual Arrangements	
Contractual arrangements between various entities involved	The project will be developed by Kakamas Hydro Electric Power (Pty) Ltd which will afterwards run the hydroelectric power plant. BWC will act as a carbon consultant to develop 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 supply clean electricity to the grid of the Republic of South Africa.
Project Description The project development envisages the construction and operation of a run-of-river hydroelectric power plant with installed capacity of 12.57 MW near the town of Kakamas in the Northern Cape Province of the RSA. The power plant will comprise of 3 hydro turbines and the associated infrastructure. The preferred turbine supplier is Hydro Power Plant (HPP). The produced electricity will be supplied to the Eskom electricity network.	
Project Constraints: There are no constraints	
Technology to be employed	Hydro Power Plant (HPP) is the preferred supplier of hydro turbines. The power plant will comprise of 3 hydro turbines and the associated infrastructure. The proposed technology is well-proven and widely used internationally. The project activity is a run-of-river design that will be constructed at the existing at the Neusberg Weir. It does not involve the construction of a reservoir. Instead the project involves construction of an intake structure with stop-log gates, 1 410 m of open canal waterway, 3 buried steel penstock pipes, a partially buried powerhouse, 200 m long tailrace canal from powerhouse back to the river and infrastructure for connection to the Eskom distribution network. Hydro Power Plant (HPP) has been designing and installing hydro power plants throughout the world since 1972. http://hydropowerplant.com
Greenhouse Gases Targeted	The implementation of the project will lead to reduction of greenhouse gas (GHG) emissions from combustion of fossil fuel for electricity generation at grid connected power plants. 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.
Emission reductions	The project is expected to be registered by the CDM Executive Board on 08/10/2014 (starting date of the crediting period).The total emission reductions at the end of the first 7-year crediting period is expected to be 467 782 tCO_2.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2014 (from 08/10/2014 to 31/12/2014)	15 269
2015	66 826

<table>
<tr><th colspan="2">Technical Summary of the project</th></tr>
<tr><td></td><td>
<table>
<tr><td>2016</td><td>66 826</td></tr>
<tr><td>2017</td><td>66 826</td></tr>
<tr><td>2018</td><td>66 826</td></tr>
<tr><td>2019</td><td>66 826</td></tr>
<tr><td>2020</td><td>66 826</td></tr>
<tr><td>2021(from 01/01/2021 to 07/10/2021)</td><td>51 557</td></tr>
<tr><td>Total estimated reductions
(tonnes of CO2 e)</td><td>467 782</td></tr>
</table>
</td></tr>
<tr><td>Baseline & Additionality Assessment</td><td>The approved simplified baseline and monitoring methodology AMS-I.D. “Grid connected renewable electricity generation” (Version 17.0) is applicable to the proposed project activity. This methodology is applicable to grid-connected renewable power generation project activities including the construction of a hydroelectric power plant.

The additionality is demonstrated according to Attachment A of Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities” (Version 08), reported as Annex 24 to EB 63. The main emphasis is made on investment barrier. In order to maintain a systematic approach, the investment analysis is conducted according to the Step 2 of the “Tool for the demonstration and assessment of additionality (version 06.0.0)

The project is additional as defined under the Kyoto Protocol because the economic parameters of the project (IRR), based on the preliminary estimation, without the CDM are unacceptably low.</td></tr>
<tr><td>Monitoring</td><td>This project will be monitored according to the rules monitoring provided in AMS-I.D. The parameter to be monitored is quantity of net electricity generation supplied by the hydroelectric power plant to the grid of the Republic of South Africa.</td></tr>
<tr><td>Type of project/activities</td><td>Energy Supply</td></tr>
<tr><td>a. Energy Supply</td><td>Renewable Energy (excluding biomass)

The hydro turbines capture the kinetic energy and potential energy (due to drop in elevation) of water to drive a turbine which is connected to a generator where this energy is subsequently converted into electricity. The produced electricity will be supplied to the grid of the Republic of South Africa.</td></tr>
<tr><td>b. Energy Demand</td><td>Not Applicable</td></tr>
<tr><td>c. Industrial Process</td><td>Not Applicable</td></tr>
<tr><td>d. Transport</td><td>Not Applicable</td></tr>
<tr><td>e. Waste Management</td><td>Not Applicable</td></tr>
<tr><td>f. Forestry/ land use</td><td>Not Applicable</td></tr>
<tr><td>g. Other</td><td>Not Applicable</td></tr>
<tr><td colspan="2">Project Boundary</td></tr>
</table>

Technical Summary of the project	
The project boundary encompasses the physical, geographical site of the renewable generation source.	
Indicate Emissions outside the Project Boundary	Not Applicable

Location of the Project	
Province	Northern Cape
Municipality	Kai! Garib Municipality
Nearest city/large town	Kakamas
Brief description of the location of the project site	The project activity will be constructed at the Neusberg Weir on the Orange River Geographical latitude: 28°46'19''S. Geographical longitude: 20°44'33'' E.

Project Schedule/Timetable	
Earliest Project Start Date	08/01/2013 (Start of construction)
When is the expected first year of CER delivery	2015
Project Lifetime	40 years
Project End Date	08/10/2054
Crediting Period	7 year renewable crediting period
Current Status or phase of the project	At the moment, the project conducted the following activities: • The Final Environmental Impact Report is completed • Record of decision has been obtained • The Feasibility Study is completed • The Draft Validation Report from DOE (Carbon Check) has been received. • The PDD has been drafted by BWC • The project has been listed as a preferred bidder under the Independent Power Producer Procurement Program (IPPPP) • Awaiting a PPA from the Department of Energy
DNA Approval	The project has not been previously submitted to the DNA for approval. A Project Identification Note (PIN) was submitted and a letter of no objection was received on 14/04/2011.
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. Worldwide expansion of the renewable energy industry points to the sustainable development of the country's economy. The implementation of the proposed project will promote development of run-of-river hydroelectric power plants in the RSA which in turn will lead to the creation of new job opportunities both during the construction and operation phases. The implementation of run-of-river hydroelectric power plants will make a contribution to achieve the objective to reduce South Africa's GHG emissions below the current emissions baseline of around 34% by 2020, and contribute to the 75 MW Small Hydro set out in accordance with the capacity allocated to renewable energy generation in IRP 2010-2030 [http://www.ipp-renewables.co.za/].

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

Yes. The project will create new job opportunities.

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

Yes. The Basic Assessment (BA) of the proposed project was carried out in accordance with the South African legislation by Aurecon. The draft Basic Assessment Report was published for public review and comment from 6 June 2011 until 19 July 2011. Hereafter the EIR was submitted to the Department of Environmental Affairs (DEA) and Environmental Authorisation was granted for the project on 13/10/2011.

i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied	The implementation of the proposed run-of-the-river hydroelectric power plant will not require the construction of a large reservoir. Therefore the disturbance of ecosystems and loss of biological diversity are avoided. A Basic Assessment was conducted and it was found that the disturbance with mitigation measure could be reduced to low for most ecosystems. Some alternative layouts had bad negative effects on the aquatic ecology, but for the preferred alternative effect was reduced a medium impact. No fatal flaws were identified. The project obtained Environmental Authorization from the Department of Environmental Affairs.
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied	The project implementation will not lead to pollution and degradation of the environment. Combustion of fossil fuels (mostly coal) at the Eskom power stations and hereby emissions of the harmful substances into the atmosphere, such as flue ash, oxides of sulphur and nitrogen will be reduced due to the project implementation.
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	The BA concluded that with mitigation procedures the impact on heritage site will be kept at low.
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	The project implementation will not lead to any changes in waste management.

responsible manner	
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	There are no non-renewable resources to be used in this project.
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.	The proposed project does not affect the depletion of renewable resources. Hydro energy is an inexhaustible source of the renewable energy.
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 project implementation will only be started when the project developer has completed a full financial and technical evaluation. The technology to be applied has been tested and proven overseas and carries no negative consequences.
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 project implementation will lead to mitigation of the negative environmental impact. The combustion of fossil fuels (mostly coal) at the Eskom power stations and hereby emissions of the harmful substances into the atmosphere, such as flue ash, oxides of sulphur and nitrogen will be reduced due to the project implementation. As part of the EIR a public participation process was undertaken to ensure that all stakeholder's rights and environmental rights are taken into account during development of this project.
Other comments South Africa is anticipating another shortage of electricity supply due to the higher than anticipated economic growth combined with a number of technical factors such as overloaded electricity lines. The country is blessed with an abundance of fossil fuels, but the use of these resources in power production is becoming increasingly difficult as international pressure mounts against countries that do not comply with strict sustainable environmental policies. Hydroelectric power plants do not only meet environmental requirements, but also provide a much needed additional source of electricity. In addition, the implementation of hydroelectric power plants makes a contribution to achievement of the goal to generate 10 000 GWh of electricity from renewable energy by 2013.	

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)	The project implementation will positively impact the air quality due to reduction of combustion of fossil fuels (mostly coal) at the grid-connected power plants. The project will not have an impact on water pollution and solid waste. Water is used to generate electricity and then returned to the river. No waste is generated by the project. The construction phase may have a minor impact on agriculture (very low impact). Noise has a low negative impact, and socio-economic has a low positive impact. These impacts are all acceptable according to the Basic Assessment Report.
	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 implementation will not have negative impacts on natural resources. Water will be used by the power plant and then returned to the river. The project developer has applied for the water use license from the Department of Water Affairs. The project implementation will lead to reduction of fossil fuel consumption (mostly coal) by current grid-connected fossil fuel power plants.
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	Changes to local or regional biodiversity arising from the project are minimal. No fatal flaws were identified in the Basic Assessment, and therefore the project obtained environmental authorisation.

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 have an impact on foreign exchange requirements as the main technological equipment of the hydroelectric power plant such as hydro turbines can only be sourced from foreign suppliers. There will be some increase in skilled labour requirements to operate the plant. The project implementation will not affect the electricity price since the hydroelectric power plants are not able to compete with coal-fired power plants because of the higher cost price of electricity generation. The sale of carbon credits generated by the project will result in increased foreign direct investment.
	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	There will be some increase in skilled labour requirements to operate the new technology. Although there are other hydropower plants in SA the current project will also demonstrate potential of power production from water in South Africa. The implementation of this project may lead to similar projects in other parts of the country.

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 a any specific sectoral objectives (for example, renewable energy targets)	Expansion of the renewable energy industry in the province points to the sustainable development of the region and the whole country. The project implementation promotes development of the RSA's energy system and creates new job opportunities in the region. The project partakes in the national bidding scheme for RSA's Renewable Energy Feed-In Tariffs. At the same time the project does not negatively affect any local industries as implemented on unused deteriorated agricultural land. The implementation of run-of-the-river hydroelectric power plants will make a contribution to achieve the objective of reducing South Africa's GHG emissions below the current emissions baseline of around 34% by 2020. This project will also contribute to the 75 MW small hydro set out in accordance with the capacity allocated to renewable energy generation in IRP 2010-2030 [http://www.ipp-renewables.co.za/].

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
	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	It is expected that 100 jobs will be created during the construction phase and 4 jobs during the operation phase. The Basic Assessment identified only positive socio-economic effects. No fatal flaws were identified and the project was granted Environmental Authorisation.

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. It contributes to technological development of the country, creates jobs in the RSA and contributes to combat climate change by reducing GHGs. The revenue from carbon credits is vital because renewable technologies require higher capital investment compared to fossil fuel powered plants.

Part D: Finance

<table>
<tr><td colspan="2">Project Costs</td></tr>
<tr><td>Development Costs (R's)</td><td></td></tr>
<tr><td>Installed Costs (R's)</td><td></td></tr>
<tr><td>Other Costs (R's)</td><td></td></tr>
<tr><td>Total Project Costs (R's)</td><td>R 433.76 million</td></tr>
<tr><td colspan="2">Sources of Finance</td></tr>
<tr><td>Equity</td><td>Not applicable</td></tr>
<tr><td>Debt (long term)</td><td>R 433.76 million</td></tr>
<tr><td>Debt (short term)</td><td>Not applicable</td></tr>
<tr><td>Amount not identified (R's)</td><td>Not applicable</td></tr>
<tr><td>Total CDM Contribution sought</td><td>Due to the fast approaching end of the Kyoto commitment period the CDM revenue has become risky to investors. The estimated price of CERs is therefore difficult to estimate accurately.
Expected CER's for this project over the first 7 year commitment period:
<table>
<tr><th>Year</th><th>Million Rand from sale of CDM revenue (assuming R100/CER)</th></tr>
<tr><td>2014 (from 08/10/2014 to 31/12/2014)</td><td>1.53</td></tr>
<tr><td>2015</td><td>6.68</td></tr>
<tr><td>2016</td><td>6.68</td></tr>
<tr><td>2017</td><td>6.68</td></tr>
<tr><td>2018</td><td>6.68</td></tr>
<tr><td>2019</td><td>6.68</td></tr>
<tr><td>2020</td><td>6.68</td></tr>
<tr><td>2021(from 01/01/2021 to 07/10/2021)</td><td>5.16</td></tr>
<tr><td>Average</td><td>6.68</td></tr>
<tr><td>Total</td><td>46.78</td></tr>
</table></td></tr>
<tr><td>Expected Price of CER in case of a contract to purchase for:
A period of 7 years</td><td>R 100 (Assumed CER value at the start of the project activity.)
A 7 year renewable crediting period was chosen for the project. The project may be renewed twice, and the total crediting period may not be more than 21 years.</td></tr>
<tr><td>Indicate the projected Internal Rate of Return for the project with and without CER revenues.</td><td>Not available at this stage.</td></tr>
</table>

Constraints on tradability of carbon credits	There are no constraints yet. It is anticipated that there may be constraints with the tradability of carbon credits post 2012.
Preliminary discussions with potential purchasers	Preliminary discussions have not taken place. The discussions will commence upon registration of the project by the EB.