

The African Develop Bank/UNEP Risoe PIN template

Title of the Project: NKHOTAKOTA GEOTHERMAL POWER PROJECT

Country : MALAWI Has ratified the Kyoto Protocol: yes no

Date submitted: 23th May 2012

Project Proponent				
Name of the applicant / project proponent	Department of Energy Studies, Mzuzu University			
Relation to the Project	Project Promoter			
Please fill in Annex 1				
Project information				
Location of the project <i>(country, province, city, village and geographical coordinates if available)</i>	Malawi, Central Region, Nkhotakota, Mawira			
Type of the project activity ¹	Geothermal electricity generation			
Scale of the project	Large Scale	Small Scale	PoA	Other
	✓			
Brief description of the project <i>(expected situation with the project)</i>	<p>The project will involve the exploration drilling and installation three 14MW generators in the first phase. It is expected that there shall be three production wells of maximum depth 1500m with flows of 270kg/s to 500kg/s and a temperature range of 165 °C – 185 °C. The plant will be able to generate about 30 MW of electricity.</p> <p>The area will be within 7 km radius from Nkhotakota District Headquarters. The project will include the hiring of drilling rigs and experts from Geothermal Development Company of Kenya. The Kenyan experts will be working together with Malawian staff to build the local capacity in the field. Drilling and construction works will be contracted out through international competitive bidding.</p>			

¹ Please use the types and subtypes in the UNEP Risoe CDMPipeline e.g.: Wind, Solar, Hydro, Biomass energy, Energy Efficiency (EE) households/service/industry etc, Fossil fuel switch, Afforestation/Reforestation, Landfill gas, Methane avoidance, N2O/HFC/PFC/SF6 removal, Transport. The subtypes can be found in the “Invest” sheet in the CDMPipeline at www.cdmpipeline.org



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	The project will use modular type of generators for future expansion and it is expected to have additional generation output of 70 MW in the second phase.	
Brief description of the technology to be employed <i>Identify technology supplier where possible</i>	Directional drilling in which all the wells will be connected to one exterior well will be used. At the design stage it is expected that Enx Binary System generators will be installed. All the geothermal fluid will be re-injected back into the ground.. According to ACM0002 the non-condensable gases are calculated as discharged to atmosphere for to be conservative. Depending on the results of the exploration drilling single flash systems may be used in the second phase of the project period.	
How common is this technology in the country?	New in the country	
CDM Methodology to be used	Approved methodology	New methodology
	ACM0002 ver 13	
Types of Green House Gases CO ₂ , CH ₄ , N ₂ O, HFC,PFC,SF ₆	CO ₂ , CH ₄ (fugitive emissions are zero , no steam production used)	
Average Annual GHG reduction in ktCO ₂ eq as in Annex 2	205,530 tCO ₂ equiv	
Please fill in Annex 2		
Background information		
Sector background <i>(laws, regulations, policies and strategies of the Host Country that are of central relevance to the proposed project, as well as any other major trends in the relevant sector)</i>	<p>The Government of Malawi in its policy needs to promote alternative energy generation. With the support from the IAEA, Malawi has done a study for the demand analysis and coming up with alternative energy supply options.</p> <p>In the alternative energy supply options and in the 2003 analysis it all came out that demand side management would improve the energy supply for development.</p> <p>There is no geothermal strategy but government has set up a Geothermal Technical Working Group to promote geothermal energy development.</p>	



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<p>Brief description of the current situation <i>(without the project)</i></p>	<p>Since electricity generation is greatly out powered by demand, private generation using diesel generators will still be applied to cover for the excess demand. This will increase the emissions into the atmosphere. close to 50MW demand is met by private generation. The geothermal power plant will therefore act as a substitution to the private diesel generators.</p> <p>The power plant will be located within 4Km from the nearby Nkhotakota Transmission Substation. The feed in voltage will be 11KV transformed to 132KV transmission voltage.</p> <p>Probably the project will be connected to the national grid in the future.</p>				
<p>Alternative project options <i>(other technologies, smaller or larger scale, and why they haven't been chosen)</i></p>	<p>The other technology would have been the flush system but it is expected that the temperatures would not be very high thus the choice of the binary technology.</p> <p>Smaller binary technologies would have been applied but the investment cost becomes too high.</p> <p>The other alternative is to increase the coal fired power plant but this despite being cheap, would increase the emissions into the atmosphere.</p>				
Project timeline					
<p>Status of the project development <i>(date of achievement or expected achievement)</i></p>	<p>Feasibility September, 2010</p>	<p>PIN May 2012</p>	<p>PDD October 2012</p>	<p>National LoA² January 2013</p>	<p>Validation June 2013</p>
<p>Expected start of construction/plantation <i>(Month / Year)</i></p>	<p>September 2014</p>				
<p>Expected start of operation <i>(Month / Year)</i></p>	<p>January, 2017 with wellhead technology and March 2021 full power plant commissioning.</p>				
<p>Crediting period</p>	<p>7 years (* 3) / 20 years (*3)</p>		<p>10 years / 30 years (fixed)</p>		

² Letter of Approval



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		7 years (*3)		
Financial information and/or Barriers				
Total investment:	US\$	US\$	% of investment	
Sources of finance	Project owner			
	Local Bank(s)		75m	
	International FI		25m	
	National grant		50m	
	Foreign Development Assistance (ODA)		100m	
	Other		100m	
	Total in US\$		350m	
	With CERs (US\$/CER)	Without CERs		
	333m	350m		
Barriers to the project				
Describe the barriers to the project	<p>Barriers to the successful implementation of the geothermal energy project at Nkhotakota would be government switching to cheap hydropower plant construction in different rivers. This would be a simpler alternative despite the fact that it could lead to flooding of some area affected by the dams.</p> <p>The other barrier would be if government would decide issuing exploratory permit that do not provide for flexibility for new investors to come in.</p> <p>Failure to acquire funding for the implementation of the project due to its high investment cost.</p>			
Project contribution to the country' sustainable development				



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<p>How the project contribute to any sustainable development criteria of the country?</p> <p><i>Social, environmental, economic and any other benefits</i></p>	<p>The project is addressing issues of energy which are highlighted in the Malawi Growth and Development Strategy(2006 - 2011). By contributing to electricity generation the project will reduce stress on the generation capability and this will enable investors to increase their economic productivity and competitiveness. This will lead to more job creation. The project works and power plant operation will also create jobs both to the surrounding communities and to professionals.</p> <p>Environmentally, the project will reduce the unmet demand and thus reduce efforts by private generators. This will held in reducing emissions and would greatly contribute to reduction in global warming.</p> <p>Emmissions from the project activity will only be due to diesel usage for standby generator since the fugitive emissions from drilling and well testing are negligible as per ACM 0002 Methodology that has been applied.</p>	
<p>According to the national regulatory framework, does the project require an Environmental Impact Assessment?</p>		<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>Project stakeholders</p>		
<p>Who are the project stakeholders?</p>	<p>Geological Survey Department of Malawi, the Test & Training Centre for Renewable Energy Technologies (Mzuzu Universty), Department of Energy Affairs and the Electricity Supply Corporation of Malawi (ESCOM), the local communities and Geothermal Projects Malawi. Other external stakeholders are GDC of Kenya and United Nations University – Geothermal Training Programme of Iceland.</p>	
<p>Have stakeholders to be affected by the project been informed / approached / consulted?</p> <p>How and when?</p>	<p>All stakeholders apart from the communities have been informed or approached.</p> <p>All Malawian partners have been approached through consultative meetings in project development. This was done from 2010 through 2012.</p> <p>GDC of Kenya has been consulted through contract on consultancy. These were consulted in 2010.</p> <p>United Nations University – Geothermal Training Programme of Iceland were approached through request for capacity building. This was done in November 2011.</p>	
<p>Project risks</p>		



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Are there any foreseen risks that might affect the implementation of the project?	The major risks are the inability to access international financing for geothermal development. Unavailability of drill rigs on the expected time.
Additional information	
Any additional information	Investment cost used in the financial calculation is US\$3, 500/Kw installed. On average the construction of the plant including full feasibility studies would takes nearly 7years, 2 yr for feasibility and five years for construction of the power plant. Department of Energy Studies, Mzuzu University has prepared the PIN with the support from Coordinator ApS.

Annex 1

Contacts details

1. The Project Owner

Name : Department of Energy Affairs
Postal address: P/B 309, Lilongwe 3, Malawi.

Phone : +265 1770688
Cell : +265 888869330
Email : lewismhango@yahoo.co.uk

Person responsible for the project/contact person³: Deputy Director of Energy Affairs

Phone : +265 1770688
Fax : +265 888869330
Email : lewismhango@yahoo.co.uk

Type of organization⁴: Government Department

³ e.g. the Company manager, the project manager, the technical director, or any legally designated person.

⁴ Type of organization can be: an individual, a private company, an NGO, a Government, a Government agency, a Municipality, etc.



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Summary of the relevant experience of the Project owner:

The department is the planning and implementing machine for the government in all energy related issues.

2. The applicant or project proponent (if different from the project owner)

Name : Department of Energy Studies

Postal Address : Mzuzu University, Private Bag 201, Mzuzu 2, Malawi

Phone : +265 1 320 722

Fax : +265 1 320 568

Email : tcret@mzuni.ac.mw

Person responsible for the project/contact person: The Vice Chancellor

Phone : +265 1 320 722 / 575

Fax : +265 1320 568 / 468

Email : registrar@mzuni.ac.mw

Summary of the relevant experience of the Project Proponent:

Energy Studies Department and the Test & Training Centre for Renewable Energy Technologies promote capacity building through training and research in all renewable energy technologies. The department was established in 2004 with support from DANIDA/UNDP under the Global Environmental Facility funded project, Barrier Removal to Renewable Energy in Malawi (BARREM).

3 The PDD consultant to the project

It is expected that the PDD will be developed in close cooperation between Department of Energy Studies, Mzuzu University (contact details above) and Coordinator ApS.

Name : Morten Pedersen

Postal address : Coordinator ApS, Damhusvænget 10, 2990 Nivå, DK

Phone : +45 30301015

Email : pedersenm@yahoo.com

Summary of the relevant experience of the Consultant:

Since 2001 Morten Pedersen has been working full-time in the carbon market.

Annex 2



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Expected GHG Emission reductions resulting from the project

GHG targeted	CO₂	CH₄	N₂O	HFCs	PFCs	SF₆
	✓	✓				

Estimated amount of emission reductions tons CO ₂ eq	Average per year	Total for the crediting period *
	205,535 t CO ₂ equiv	21 years

* 7 years renewable crediting period or 10 year fixed (non-renewable) crediting period
For forestry (LULUCF) projects 20 years renewable or 30 years fixed crediting period

YEAR	Estimated emission reductions Tons CO ₂ eq	YEAR	Estimated emission reductions Tons CO ₂ eq
1	205,530	12	205,530
2	205,530	13	205,530
3	205,530	14	205,530
4	205,530	15	205,530
5	205,530	16	205,530
6	205,530	17	205,530
7	205,530	18	205,530
8	205,530	19	205,530
9	205,530	20	205,530
10	205,530	21	205,530
11	205,530		
Total		Total	4316,130

If the consultant who made the emission reductions estimates is different from the one whose details are given in Annex 1, please provide his details below:

Name : Kondwani Thapasila Gondwe
 Postal address : Energy Studies Department, Mzuzu University, P/Bag 201,
 Mzuzu 2, Malawi
 Phone : +265 884 334 416
 Fax : +265 1 320 568
 Email : kondwanithapasila@yahoo.com



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ACP MEAS⁹