Kigali, on 28/10/2019

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**REQUEST FOR EXPRESSION OF INTEREST**

**Title of the assignment:** **Hiring an Individual Consultant for Capacity building and optimization of technology for monitoring gas concertation and gas pressure in lake Kivu**

**Source of Fund: The Kingdom of Netherlands**

1. **Background**

Lake Kivu is situated in the East African Rift Valley near the equator at an elevation of 1463 m. The lake is bordered by two active volcanoes to the north and is shared between the Republic of Rwanda and the Democratic Republic of the Congo.

According to studies carried out in the 1970s, Lake Kivu contains exceptionally large amounts of gases: ~300 km3 of carbon dioxide (CO2) and ~60 km3 (at 0 °C and 1 atm) of methane (CH4). Different hypotheses have been put forward to explain the origin of these dissolved gases. A twofold origin is suggested: magmatic CO2 origin and bacterial methanogenesis (Schoell et al., 1988). There is nevertheless no strong agreement or consensus on this origin.

In the permanently stratified anoxic hypolimnion, exceptional amounts of CH4 and CO2 have been accumulating over hundreds of years. Nowadays, gas saturation reaches up to ~55 %. With different methodologies and equipment, it has been estimated that CH4 concentrations increased by up to 15 % between 1974 (Tietze, 1978) and 2004 (Schmid, 2005), and that 100 % saturation could be reached within hundred years. The accuracy of these results is however subject to discussion.

These gases are thus a tremendous hazard for this densely populated region. Their sudden potential release (triggered by volcanic or tectonic activity or after reaching saturation) could have catastrophic consequences of unprecedented dimensions. On the other hand, the dissolved gases should be transformed into useful products and/or be a valuable renewable energy source for the two bordering countries Rwanda and DR Congo, already in big energy crisis.

It is in that regard that the government of Rwanda has been investing a lot of efforts to extract that exceptional reserve. In 2008, the Government of Rwanda started extraction of CH4 from Lake Kivu by KP1 (Kibuye Power 1 of 3 MW) pilot plant. An additional large-scale gas extraction facility by KivuWatt (25MW) started in January 2016. Another concession of 50MW has also been given to SYMBION. On Congolese part of the lake, a concession was provided to EPPM and others are to come.

In addition, in 2018, the government of Rwanda updated estimation of gas reserves through a “gas working group”. The group successfully updated the estimation of gas reserves and an agreed about protocol of measuring the concentration of dissolved gases in water. The gas working group was composed by international experts already carrying out researches on Lake Kivu’s gases, using different methods. Experts made measurements of gas in March 2018 and deduced from the comparisons of their methodologies and results of their researches, the suitable methodology of sampling and measuring of gases dissolved in Lake Kivu and further monitoring of gas concentration and gas pressure.

Gas study concluded that for future gas monitoring, improvements are mandatory. Therefore, we have initiated this assignment for capacity building and optimization the technology of measurement of pressure and gas concentration in Lake Kivu.

1. **Scope of the service**

This assignment aims at:

**For monitoring of gas pressure:**

1. Optimize of the methodology recently used by UFZ (Helmholtz Centre for Environmental Research - Germany) in the” Gas study” to estimate gas reserves in Lake Kivu by measuring **gas pressure** at different depth, with precision and accuracy;
2. Ensure that developer of equipment define all technical specifications of independent systems of monitoring gas pressure in Lake Kivu;
3. Ensure that developer of equipment, define technical specifications and quantities of spare parts (sensors, O-rings, tools…) and consumables (batteries…) for the system of monitoring gas pressure in lake Kivu;
4. Supervise the training of local staff on the use of equipment provided by the consultant;
5. Provide training on software of analysis to be used in data processing and reporting (MATLAB…);
6. Update the protocol for measurement, data processing and reporting of monitoring gas pressure in Lake Kivu with precision and accuracy.

**For monitoring of CH4 and CO2 gas concentration:**

1. Optimize the methodology recently used by UFZ (Helmholtz Centre for Environmental Research - Germany) in the “gas study” to measure the **gas concentration** at different depth in Lake Kivu, with precision and accuracy (by sampling, degassing, weighting of samples and transferring samples from bags to GC);
2. Ensure that developer of equipment, define and avail all technical specifications of independent systems of monitoring gas concentration in Lake Kivu;
3. Supervise that the supplier provides technical specifications and quantities of spare parts (sensors, O-rings, tools…) and consumables (batteries…) for the system of monitoring gas concentration in lake Kivu;
4. Provide complete training to local staffs on use of equipment, data processing and reporting (including software of analysis);
5. Setup an updated protocol for measurement, processing and report of monitoring gas concentration in Lake Kivu with precision and accuracy.

**For measurement of gases in LKMP’s laboratory using Gas Chromatograph**

1. Supervise the firm to update the Gas Chromatograph (GC) of LKMP by optimizing the technology and by defining required tools for transfer of the sample from sampling bags to GC;
2. Evaluate the firm to update the GC of LKMP to avail setup and update the protocol for gas sampling and transfer of gas samples from sampling bags to GC with precision and accuracy.
3. **Objective**

The objective of this assignment is to put in place a methodology, technical specifications and avail training for staff of LKMP to be self-reliant in monitoring and reporting gas pressure and gas concentration in Lake Kivu, with accuracy and precision. This will lead to sustainable management of gas resources in the lake and timely assess the lake stability.

1. **Duration of the assignment**

The assignment should last 18 months.

1. **Qualifications and experience of the individual consultant**

The consultant should have the following qualifications and experience:

* Have at a PhD qualification in physics, chemistry, environmental or related fields with experience in stratification and transport in lakes, meromixis, internal waves, development of methodology of measuring dissolved gas, modelling of lakes and/or other related fields;
* Extensive knowledge and experience in designing equipment for measurement of Gas pressure and Gas concentration;
* Proficiency knowledge and use of analytical software, math lab, R or python;
* Demonstrated experience in supervising scientific researches;
* Outstanding interpersonal skills;
* Good communication and reporting skills;
* Knowledge and professional practice of English and/or French.

6**. Consultant selection**

This assignment will be carried out by Individual Consultant. Selection method will comply with Rwanda National Procurement Law and regulations.

Interested individual consultants are requested to submit their updated and detailed CV’s accompanied by copies of degrees or certificates and any other relevant document demonstrating his or her experience to the below emails by not later than **22nd November 2019 at 5:00 pm local time.**

The Managing Director of Energy Development Corporation Ltd

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Done at Kigali, on 28th October 2019

**RUHIGULA Jackson GAFULEKA Felix GAKUBA**

**Head Procurement Management Services Managing Director**