

AFRICAN UNION

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REQUEST FOR PROPOSALS

Consultancy Services to undertake Resource Assessment and GIS Mapping Assessment for Small Hydropower Potential in Eastern and Southern Africa

PROCUREMENT NO: AUC/IED/C/380

October, 2018

Section I: Letter of Invitation

17th October, 2018

Dear Sir/Madam,

REF: Consultancy Services to undertake a Resource Assessment and GIS Mapping for Small Hydropower Potential in Eastern and Southern Africa

1. The African Union Commission (AUC) would like to engage the services of a Consulting Firm to provide services **to undertake a Resource Assessment and GIS Mapping for Small Hydropower Potential in Eastern and Southern Africa**. The AUC invites interested and eligible bidders to submit technical and financial proposals for the assignment as per attached Terms of Reference (TOR).
2. A firm will be selected under **Quality and Cost Based Selection Method procedures**. The **TECHNICAL** and **FINANCIAL** offers must be delivered in **TWO SEPARATE** envelopes enclosed in an OUTER envelope to the address below. The minimum technical score required to pass is 70% to proceed for financial evaluation. The combined score will be calculated using the weights of 80% for the Technical Score and 20% for the Financial Score.
3. The deadline for submission of proposal is **16th November, 2018** at 1500hrs East Africa Time. Late bids will be rejected and returned unopened to bidders. The Outer envelope should bear the name and address of the bidder. Language of the bid or proposal should be in English.
4. Bidders may request for clarifications no less than 7 days from the deadline for submission, from The Chairperson, Internal Procurement Committee, African Union Commission, Email : tender@africa-union.org
5. Bidders must provide the following documents :
 - (i) Certificate of Incorporation (Company Registration);
 - (ii) At least 3 contactable references in the last five (5) years; and
 - (iii) Company profile demonstrating at least five (5) years' experience.
6. The address for deposit of bids is: The Chairperson, Internal Procurement Committee, African Union Commission, Building C, 3rd floor, TENDER BOX, Roosevelt Street, and P. O. Box 3243, Addis Ababa, Ethiopia.

Yours sincerely,

Head, Procurement, Travel and Stores Division

**Department of Infrastructure and Energy
Division**

**Consultancy Services to undertake Resource
Assessment and GIS Mapping for Small
Hydropower Potential in Eastern and Southern
Africa**

TERMS OF REFERENCE

October, 2018

Addis Ababa, Ethiopia

Terms of Reference for Consultancy Services to undertake Resource Assessment and GIS Mapping for Small Hydropower Potential in Eastern and Southern Africa

1. Introduction and Background

Small Hydropower is a proven and internationally recognized source of clean energy which has played and continues to play an important role for the global energy supply. Small hydropower development is being given priority globally to cater for increasing energy demands and improved energy access. In South Asia and South America, countries such as China, Brazil, Nepal and Peru only to mention a few have taken advantage of small hydropower as a solution to successfully contribute towards solving the problem of rural electrification and energy access, improving living standards and production conditions, promoting rural economic development, alleviating poverty as well as reducing carbon emissions.

Despite the global community rapidly adopting small hydropower for rural electrification and improving access, Africa has not yet fully benefitted from this transition due to many barriers and constraints. As a result, Africa is characterized by a relatively low level of installed capacity compared to other regions with some reports suggesting that approximately only 5% of the available potential has been developed. Contrast this against over 600 million people of Africa's population who are energy poor and lack access to modern clean energy services.

The African Union Commission (AUC) and its partners have been making efforts to support and initiate energy access in line with the UN Sustainable Development Goal number 7 of affordable and clean energy for all and the African Union Agenda 2063 Aspiration number 1 which outlines the need for sustainable development by providing access to improved standard of living, health facilities, education and skills based on science, technology and innovation, modernized infrastructure and decent and affordable housing, water, sanitation, transport, energy and ICT.

Recognising that small hydropower development is likely to be a low-cost and high-impact approach for increasing energy access with many accompanying benefits, the AUC has designed a programme for small hydropower development in which **Resource Assessment and GIS Mapping** is the first component. The AUC, is therefore, seeking suitable consultancy firms to carry out the assignment for Eastern and Southern Africa. The countries and regional organisations covered in these regions are listed in Appendix 1.

2. Objectives of the Assignment

3.

The AUC intends to roll out a programme to stimulate investment and increase the implementation of small hydropower projects in the African continent. However, it is difficult to plan for resources which are not quantified, thus the first activity is an assessment to determine the available resources and potential for further investment.

Against this background a consultant will develop a GIS mapping tool to identify promising geographical areas and river sections for the future development of small hydropower projects. In such areas/ river sections measurement campaigns shall be started.

The web-based GIS mapping of hydropower resources will facilitate open knowledge sharing on small hydropower in the region, among centers of renewable energy & energy efficiency and Regional Economic Communities (RECs) for utilization by different stakeholders such as project developers, utilities, energy ministries, etc. for supporting the identification and implementation of small hydropower projects in the member countries.

The objectives of the assignment are to:

- Design a baseline resource assessment methodology, guided by, but not confined to, the template in Appendix 2
- Conduct a baseline resource assessment for small hydropower potential, institutional arrangements and technical capacity in each country in the region
- Determine the theoretical capacity of each country/region by developing a web based GIS resource mapping tool for hydropower sites with potential of between 1MW and 30MW.

4. Scope of Work

The Consultant is expected to carry out the following activities that will assist in coming up with a comprehensive resource assessment baseline study. The major tasks are:

3.1 Undertake a Desk Study

The consultant is expected to conduct a desk study, at country and regional level. The desk study should be detailed to country and REC level. The assessment should include, but not limited to, the following aspects:

- Installed, decommissioned and planned small hydropower (SHP) plants
- Policy, regulatory and institutional arrangements and instruments which support or hinder SHP development
- Major barriers and enablers to development of SHP in the country
- Technical Capacity Availability
- Capacity building institutes such as research centres and universities training on SHP development

3.2 Develop a Web based GIS Small Hydropower Resource Map

The consultant is expected to develop a web-based GIS small hydropower resource mapping model, which includes the following layers for each country, but is not limited to:

- Climate
- Hydrology
- Hydropower Potential
- Climate Change

3.3 Methods and Models to be used

The bidder shall explain in his proposal the methods and procedures he will apply to create the requested outputs for the GIS hydropower resource mapping (see provisions of section 4.2 and 4.3). The bidder shall choose the methods and processes which are most suitable considering the following provisions in paragraphs A1 to A3.

The bidder is requested to take into consideration updated data sets and maps for hydrological modellings for African River Basins (or any other later updates versions):

- a) Development of a data set for hydrological modelling. Input layers related to topography, channel geometry, land cover and soil characteristics of European and African river basins (chapters 3.8.2 Development of Local Drain Direction Map, 3.9.5 Land Cover Data and chapter 5 New African Input Maps <http://bookshop.europa.eu/en/development-of-a-data-set-for-continental-hydrologic-modelling-pbLBNA24087/>
- b) The Availability of Renewable Energies in a Changing Africa (chapter 5 Expected Changes in Hydropower Resources, 2013) <http://bookshop.europa.eu/en/the-availability-of-renewable-energies-in-a-changing-africa-pbLDNA25980/>,

A1) Digital Elevation Model Accuracy

The Digital Elevation Model (DEM) should have the highest possible accuracy which is available on the market for free. The bidder is asked to disclose the name of provider of the DEM and to inform about the vertical and horizontal accuracy of the selected model. If the bidder recommends to use a DEM with higher accuracy, and this DEM involves additional costs for the AUC, the bidder shall disclose the costs in the financial proposal.

A2) Digital Elevation Model

In order to analyze the theoretical linear potential of the streams, a hydrographic network is generated from a DEM. The bidder is requested to explain how he wants

to avoid the following typical problems which can probably appear when creating a hydrographic network:

- a) In flat areas the modelled river ways are poorly reconstituted as the valley line of the natural water streams are not sufficiently indicated (the required accuracy of elevation data and model maybe not be provided). In such zones, modelling creates several parallel features which do not correspond to reality at all.
- b) In many areas, water does not flow sufficiently to create permanent valley lines. In such cases the valley lines do not correspond to the waterways in reality.

The bidder is free to identify any other problems which may arise in the process and clearly explain how they will tackle them.

A3) Precipitation Data and Net Rainfall

With the submission of proposal, the bidder shall explain the fundamentals of the calculation of the runoff data. As trustworthy long-term hydrological measurements are not always available, the idea is to use seasonal precipitation data which correspond to the climatic zones under consideration. The bidder shall explain how the precipitation data is converted into net rainfall (the part of rainfall that flows into the modelled river network, considering evaporation and drainage to ground water) and how the conditions of several African climatic zones are considered.

A4) Quality Assurance and Calibration of Calculated Results

During project execution, the consultant shall explore credible sources of measured river discharges and use these sources to evaluate if the data improves the quality and accuracy of calculated results. If yes, the bidder shall reasonably select subareas and compare calculated river discharge values with measured discharge data.

AUC reserves the right to nominate a project/ quality assurance manager who will closely coordinate the project with the consultant. All data, maps, defined parameters and calculated results shall be kept at the premises of the consultant and shall be open to inspection and acceptance by the project/ quality assurance manager.

A5) GIS Layers and Outputs according to ISO Standards

The Contractor will be obligated to submit the GIS outputs and layers with the metadata according to ISO standards (ISO 19115-1:2014/Amd 1:2018 and 19139-2:2012).

5. Expected Output

The main outputs from this assignment are:

- 4.1 A Regional Baseline report which contains the following information for each country**

- 4.1.1 Existing Hydropower Resource potential
- 4.1.2 Projected Activities and potential sites
- 4.1.3 Institutional, legal and regulatory framework
- 4.1.4 Activities promoting small hydropower
- 4.1.5 Technical capacity available
- 4.1.6 Institutes conducting training on small hydropower development

4.2 GIS Mapping of Small Hydropower Potential

4.2.1 Layer with Climatic Zones

This layer shall show the relevant climatic zones for the specific region. A click on the zone reveals data about monthly averages of precipitations and temperatures in the selected zone. Adequate graph will be shown including information about source and year of precipitation data.

4.2.2 Layer with Single River Channels in the selected River Basin

The bidder defines a suitable spectrum for the length of river channels (river sections) that is to say the bidder schedules the smallest unit under consideration. The bidder shall explain the spectrum he defines (about min. and max. length of river channels/sections in km).

The river channels (river sections) will be colored according to their specific power generation potential. A colored scale/ legend will explain the categories of the generation potentials. The bidder is requested to explain about the number of categories in the scales and about the min./max. values for defined categories. There shall be one unique scale for all river basins.

After zooming-in, each river section can be seen in more detail. The bidder is requested to describe how he wants to visualize the river network for the complete river basin. For better orientation of the end user the river basin shall be structured and divided into sub areas (or sub-catchment areas). The bidder is asked to explain how he is going to ensure a comfortable orientation for the end user (e.g. displaying borders of sub areas, using gradient fill in colors for subareas, numbering of sub areas, etc.).

4.2.2.1 Template for River Channels (River Sections)

With a click on the river channels (river sections) the user can open a template with the following data for the selected river section:

- ID number of subareas and of rivers sections
- Name of country(ies)
- Specific generation potential in kW /km or in MW /km

By clicking on the template, a separate webpage will open. The webpage will show a summary table for all river channels (river sections) of a river basin. The summary

table will show the data for the selected river channel (river section) in the first line of the table (user doesn't need to scroll down or up). The data sets of river channels (river sections) will have the following content:

- ID number of subareas and of river sections
- Name of country(is)
- Specific generation potential in kW /km or in MW /km
- Yearly average discharge (m^3/s)
- Upstream area in km^2
- River channel (river section) length in km
- Elevation max. in m
- Elevation min. in m
- Slope of river channel (river section) in m/ km

The bidder should explain how the following graphs can be created for each river channel (river section):

4.2.2.2 Graph with Longitudinal Section

Graph with the river's longitudinal section (showing the profile of the river from the selected point till the river mouth).

4.2.2.3 Graph with Monthly Discharge Values

Graph with monthly river discharge values in the selected river section in m^3/s .

The graphs of 4.2.2.2 and 4.2.2.3 shall be shown in the summary table as well

The graphs for each river section shall be prepared by the bidder. The bidder and AUC will define the technical requirements for the handover of outputs during project execution.

4.3 Layers with Sub areas

The bidder shall explain how he will define sub-areas in the given river basin (e.g. subareas defined by catchment areas). The goal is to have the average size of subareas in km^2 more or less the same for all river basins, i.e. large river basins will have a higher number of defined subareas.

The bidder shall provide the following layers which show the attractiveness of subareas for hydropower project development.

4.3.1 Power Generation Potentials of Sub areas in GWh or in TWh

This layer will show the sums of power generation potentials in subareas.

4.3.2 Suitability of Sub areas for Plant Sizes

e.g. for pico-micro-mini up to 1 MW / for small scale hydro 1MW-30MW / medium and large hydro above 30 MW.

4.3.3 Suitability of Subareas for Various Types of Hydropower Machines

e.g. high pressure, medium and low pressure machines

4.3.4 Suitability of Subareas for Various Plant Types

e.g. plant with dam and water reservoir / plant with diverted river water without reservoir.

4.3.5 Suitability according to Further Criteria

The bidder is requested to suggest which further criteria could be relevant to show the attractiveness of sub-areas for hydropower development e.g. for a combination of various attributes 4.3.1) to 4.3.4) etc.

For visualization of above mentioned attributes the bidder shall provide an easy to understand scale/ legend for each layer. For each attribute (for each layer) one unique scale/legend should be applied to all sub regions and to all river basins (in future project phases).

4.4 Country Reports (Small Hydropower Potentials by Countries)

The bidder shall make recommendations for creating layers with information about countries (power generation potentials per country, attractiveness of different plant sizes within each country, and so on). The bidder is free to offer any other layers which might be interesting for country reports. Extensive country reports (with maps, tables, figures and accompanying text) would be a key outcome for this study

4.5 Final Report

The Contractor shall provide a summary report with the following content:

- i. to describe methods used, calculations and main work stages
- ii. to declare the source of input data used (climate & precipitation, elevation models, hydrological data, ...)
- iii. to specify the main assumptions of his calculations and to declare in which regard the assumptions possibly do not meet reality
- iv. to estimate the degree of inaccuracy of reported results for river discharges including a statement on how the inaccuracy was estimated
- v. to provide the following information about the river basin: number of created river channels, average length of river channels, number of subareas in the river basin
- vi. description of results and conclusions regarding attractiveness of identified sub regions in a river basin

- vii. recommendations for new measurement campaigns for identified sub areas (or new measurement campaigns in downstream locations of the main river to re-calculate discharge data for several identified upstream sub areas)
- viii. recommendations for further activities to localize specific attractive sites in attractive sub regions

The final report shall provide above information in a comprehensible, structured format. The text document should be as short as possible without leaving important information for the end user.

5.0 Consultancy Competencies

5.1 Profile of the Bidder/ Company

- Scale of projects and experience in the sector of small hydropower project development
- Have a traceable record in scale of projects and experience in GIS mapping
- Scale of projects and experience in hydrological studies and evaluations of small hydropower project developments

5.2 Profile of Contractor’s Project Team

- The lead consultant should have at least 10 years’ experience working in the renewable energy sector
- Advanced degrees in web design and Geographic Information System (GIS) and relevant fields
- At least 5 years of experience of the proposed project team in web design and development and/or design of a GIS system
- At least 7 years of experience in modelling and calculation of river flows using precipitation data and digital topology models as basic input data
- Track record of the project team in implementing GIS hydropower resource maps
- Proficiency in web GIS systems such as Geoserver, PostgreSQL(PostGIS), OpenLayers, MapWindow and compliance to OGC standards
- Command of English language.

6.0 Project Time Frame

	Activity	Timeframe
Eastern Africa	Desk Study	2 months
	Technical Report + Baseline Report Writing	1 month
	Development of Web based GIS Study	6 months
Southern Africa	Desk Study	2 months
	Technical Report + Baseline Report Writing	1 month
	Development of Web based GIS Study	8 months

7.0 Suggested Literature / Sources of Information

In preparation of the proposal and execution of the tasks the consultant may be guided by the following documents:

- Policy Framework and Programme Design for Small Hydropower and Solar Energy Development in Africa' (2018).
- Technical Report on Methodology and Lessons Learnt for ECOWAS countries
- Baseline Report on Existing and potential small-scale hydropower systems in the ECOWAS region

Appendix 1: Definition of Regions

Region	Member States	Regional Economic Communities/Regional Centres for Renewable Energy and Energy Efficiency
Eastern Africa	Burundi	COMESA EAC IGAD EACREEE
	Djibouti	
	Eritrea	
	Ethiopia	
	Kenya	
	Rwanda	
	Somalia	
	South Sudan	
	Sudan	
	Tanzania	
	Uganda	
	Southern African	
Botswana		
Comoros		
DRC		
Lesotho		
Madagascar		
Malawi		
Mauritius		
Mozambique		
Namibia		
Seychelles		
South Africa		
Swaziland		
Zambia		
Zimbabwe		

Appendix 2: Resource Assessment Template

Member States	A	B	C
Category A: Small Hydropower Potential			
1.Installed Capacity			
2. Operational Plants			
3.Decommissioned Plants			
4.Planned			
5.Number of licensed Projects			
Category B: Technical Scoping			
1.Are there any institutes doing specialising in O&M training for SHP			
2.Planned or potential versus trained Engineers (information can be obtained from professional affiliations or Engineering bodies e.g. SAEE)			
Category C: Institutional Arrangements			
1. Do we have instruments which support SHP			
2. What are the institutional and regulatory arrangements			
3. What process do you go through to start an off-grid or grid connected SHP IPP?			

SELECTION CRITERIA

S/N	AWARD CRITERIA	ALLOCATED SCORES
1.	Specific experience of the Consultants related to the assignment	10
2.	Adequacy of the proposed work plan and methodology	40
3.	Qualification and Competence of the key staff for the assignment	40
4.	Knowledge and experience of the region	5
5.	Language	5
	TOTAL POINTS	100

The minimum technical score required to pass is 70% to proceed for financial evaluation.

The lowest priced Financial Proposal (Fm) will be given a financial score (Sf) of 100 points. The financial scores (Sf) of the other Financial Proposals will be computed as follows: $Sf = 100 \times Fm/F$; Where Sf is the financial score, Fm is the lowest price and F the price of the proposal under consideration.

The final score (S) will be computed by combining technical (St) and financial (Sf) scores using the weights of 80% for the Technical Proposal and 20% for the Financial Proposal using the formula: $S = St \times 80\% + Sf \times 20\%$.

Conflict Of Interest

African Union policy requires consultants to provide professional, objective, and impartial advice, and at all times hold the Client's interests paramount, without any consideration for future work, and strictly avoid conflicts with other assignments or their own corporate interests. Consultants shall not be hired for any assignment that would be in conflict with their prior or current obligations to other clients, or that may place them in a position of not being able to carry out the assignment in the best interests of the Client.

Without limitation on the generality of this rule, consultants shall not be hired under the circumstances set forth below:

(a) Conflict between consulting activities and procurement of goods, works or services: A firm that has been engaged to provide goods, works, or services for a project, and each of its affiliates, shall be disqualified from providing consulting services related to those goods, works or services. Conversely, a firm hired to provide consulting services for the preparation or implementation of a project, and each of its affiliates, shall be disqualified from subsequently providing goods, works or services resulting from or directly related to the firm's consulting services for such preparation or implementation (other than a continuation of the firms earlier consulting services for the same project).

(b) Conflict among consulting assignments: Neither consultants (including their personnel and sub-consultants) nor any of their affiliates shall be hired for any assignment that, by its nature, may be in conflict with another assignment of the consultants.

(c) Relationship with AUC staff: Consultants (including their personnel and sub-consultants) that have a business or family relationship with a member of AUC staff (or of the Client staff, or of a beneficiary of the assignment) who are directly or indirectly involved in any part of: (i) the preparation of the TOR of the contract, (ii) the Page 20 of 22

selection process for such contract, or (iii) supervision of such contract may not be awarded a contract.

The African Union requires that Officers of the AU, as well as Bidders/ Suppliers/ Contractors/ Consultants, observe the highest standard of ethics during the procurement and execution of such contracts.² In pursuance of this policy the AU:

² In this context, any action taken by a bidder, supplier, contractor, sub-contractor or consultant to influence the procurement process or contract execution for undue advantage is improper. Page 21 of 22

(a) defines, for the purposes of this provision, the terms set forth below as follows:

- (i) “corrupt practice”³ is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- (ii) “fraudulent practice”⁴ is any act or omission including a misrepresentation that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
- (iii) “collusive practice”⁵ is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
- (iv) “coercive practice”⁶ is impairing or harming or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
- (v) “obstructive practice” is deliberately destroying, falsifying, altering or concealing of evidence material to any investigation or making false statements to investigators in order to materially impede any investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation;
- (b) will reject a recommendation for award of contract if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;
- (c) will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded an African Union financed contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, an African Union financed contract.

Consultants shall not be under declaration of ineligibility for corrupt, fraudulent, collusive, coercive or obstructive practices issued by the African Union.

3 “another party” refers to an officer of the AU acting in relation to the procurement process or contract execution. In this context, “officer of the AU” includes staff and employees of other organisations taking or reviewing procurement decisions.

4 a “party” refers to any officer of the AU; the terms “benefit” and “obligation” relate to the procurement process or contract execution; and the “act or omission” is intended to influence the procurement process or contract execution.

5 “parties” refers to any participants in the procurement process (including officers of the AU) attempting to establish bid prices at artificial, non competitive levels.

6 a “party” refers to any participant in the procurement process or contract execution.

Submission of Technical Proposal

The Technical Proposal shall provide the following information:

(i) A brief description of the firm's organization and an outline of recent experience on assignments of a similar nature. For each assignment, the outline should indicate, inter-alia, the profiles of the staff proposed, duration of the assignment, contract amount, and the firm's involvement.

(ii) Any comments or suggestions on the Terms of Reference and on the data, a list of services, and facilities to be provided by the Client.

(iii) A description of the methodology and work plan for performing the assignment. Page 22 of 22

(iv) The list of the proposed staff team by specialty, the tasks that would be assigned to each staff team member, and their timing.

(v) CVs recently signed by the proposed professional staff and the authorized representative submitting the proposal. Key information should include number of years working for the firm/entity and degree of responsibility held in various assignments during the last ten (10) years.

(vi) Estimates of the total staff input (professional and support staff; staff time) needed to carry out the assignment, supported by bar-chart diagrams showing the time proposed for each professional staff team member.

The Technical Proposal shall not include any financial information.

Submission of Financial Proposals

1. Financial Proposals must be sealed in a separate envelope.

2. In preparing the Financial Proposal, consultants are expected to take into account the requirements and conditions outlined in the RFP documents.

3. The Financial Proposal shall include all the costs the consultant incurs to provide the services (including travel expenses, translation, printing and the taxes the consultant pays for its business requirements by the law of the domicile country of the consultant), but shall exclude all local taxes levied within African Union Member States on the invoice issued by the consultant (such as local sales tax, services tax or withholding tax).