

**TERMS OF REFERENCE****Assessment of desalination investment opportunities in the SEMED Region****1. BACKGROUND**

The economics of desalination are changing rapidly. Growing water demand at coastal locations in mostly arid countries has been the driving force for building new desalination plants; through innovation desalination is increasingly becoming a viable alternative to traditional freshwater resources. Global demand for water continues to increase whilst freshwater sources are becoming scarce due to increasing demand for natural resources and the impacts of climate change, particularly in semi-arid and coastal areas. Desalination of seawater and brackish water can be used to augment the increasing demand for fresh water supplies. Significant advances in desalination have occurred over recent years yet they remain an energy intensive process. With increasing demand for desalinated water there is a large market potential for renewable energy-powered desalination systems. Satisfying demands for freshwater is expected to become increasingly difficult in the context of a changing climate, with many regions facing more variable precipitation patterns and decreased water availability. Countries in the SEMED<sup>1</sup> region in particular are facing extreme water scarcity. Understanding the range of potential water resources in this region is essential in order to diversify the countries' water management portfolio and to increase water security across the region.

The European Bank for Reconstruction and Development (the "EBRD" or the "Bank") would like to engage a consultancy firm (the "Consultant") to perform a market review of desalination technologies and an analysis of investment opportunities in desalination projects in the SEMED region (the "Assignment"). The Assignment is consistent with the EBRD's Green Economy Transition ("GET") approach, which aims to promote efficient use of water resources, and to address climate change mitigation and adaptation in the EBRD's countries of operations ("CoOs") through increasing the market penetration of water-efficient technologies and building markets for sustainable water use.

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<sup>1</sup> Southern and Eastern Mediterranean Region which includes Morocco, Tunisia, Egypt, Jordan and Lebanon.

## **2. OBJECTIVES**

With particular focus on consistency with its GET approach, the EBRD is launching this Assignment with the following objectives:

- To review desalination markets and provide updated country desalination and water resources profiles;
- To assess available technologies, their environmental impact and energy requirements and develop eligibility and impact assessment in line with the EBRD's GET approach;
- Explore the potential for renewable energy options and the conditions necessary for their use; and
- To develop specific case studies for investment opportunities in desalination in selected SEMED CoOs.

The results of this Assignment are intended to be applied primarily within the context of EBRD lending activities and investment planning, resource appraisal, project appraisal, cost benefit and economic analyses as well as policy dialogue activities pursued by the Bank in the water sector. As such, the main result of this Assignment is to review, update and adjust, where needed, the GET methodology for desalination projects in line with the findings of this Assignment and develop examples of potential GET desalination projects EBRD could finance. The results shall also reflect the short-term, mid-term and long-term activities that EBRD could undertake by also outlining key trends and opportunities in the markets.

This Assignment is focussing on the following countries: Egypt, Jordan, Morocco, Tunisia, and Lebanon.

## **3. SCOPE OF WORK**

The Assignment will entail the following 3 tasks:

### **TASK 1: GLOBAL TRENDS AND COUNTRY PROFILES**

#### **1.1 Desalination Global Trends**

Prepare a brief overview of current and future global desalination trends. Indicate which other EBRD CoOs could be relevant for a similar assignment in the future, considering the wider global trends.

#### **1.2 Country Profiles**

For each country, the Consultant will prepare a:

- Current desalination profile: A summary of (major) existing desalination plants and their performance with details on commissioning date, installed capacity, plant size, technology, water quality, user category, energy consumption, operating model (BO, BOT, PPP), costs etc.
- Water Resources Profile and Water Demand Scenario:
  - Current water demand and supply profile, current and projected water gaps in medium-term in 2030 and long-term in 2050, quantify the effects of climate change on the future availability of natural surface and groundwater resources;
  - Water resources availability, production outage, demand, allocation, consumption, water stress analysis, desalination in national water security strategies.
- Provide an outlook of the desalination potential for each country and map potential desalination investment opportunities in the EBRD countries of operation:
  - Demonstrate number and size of required plants based on current and expected supply shortfalls (using future demand scenario and other criteria in line with the results of tasks above);
  - Provide guidance to EBRD on how to engage with countries where there are significant opportunities to promote desalination as climate resilience water supply solution.
- A list of all data and information which served as input to the study (water data, desalination related sources and databases such as Aquastat (FAO), WRI, Pacific Institute, GWI, IDA, IRENA, include national sources where possible and consultants expertise in desalination and power plant projects).

## **TASK 2: TECHNOLOGY ASSESSMENT AND GET CONSISTENT ASSESSMENT TOOLS**

### **2.1 Best available desalination technologies**

The aim of this task is to provide an assessment of best available desalination technologies (BAT), technical specification, environmental impacts and energy requirements as well as cost aspects. The Consultant will:

- Review and summarise the latest development on desalination technology, including considerations on how to make desalination a greener/ more sustainable solution (integration with renewables).
  - Provide descriptions of best available desalination technologies with key technical and economic data and screening criteria. A list of authoritative sources should be included in the Final Report.

- Outline challenges/ barriers to developing desalination projects integrated with renewables and discuss conditions/ requirements that would need to be in place to make the project feasible and bankable.
- Provide whole life cost estimations including capital investment costs and operational costs for typical plants: water production costs, typical OPEX/CAPEX ranges, etc. and assess cost recovery water pricing. Illustrate cost and desalination plant size, type etc. relationships graphically.
- Assess key energy requirements (electricity and heat demand), emphasise value of heat assessment (equivalent electricity approach) considerations and appropriateness of the tool.
- Provide an overview on international/local level technology suppliers and project developers, outlining:
  - key players/ who would be best to manage such a project; and
  - key operators of desalination plants and typical financing models.
- Analyse environmental impact of concentrate discharge/ disposal of brine and outline sustainable solutions for brine disposal, re-use and/or recycle to avoid or minimise negative environmental impact/ measures for environmental impact mitigation.

## 2.2 GET Desalination Assessment Tool

The aim of this task is to develop an assessment framework and tools for potential desalination projects in the EBRD countries of operations in line with the GET approach and GET Handbook. The Consultant will:

- Review the criteria for GET eligibility of desalination projects in Annex 5.4 GET Finance for Desalination Projects and propose any changes or updates needed.
- Develop a framework for positively presenting and assessing desalination projects, taking into account the EBRD's GET approach and metrics (incl. those presented in GET Handbook, in particular Annex 4 Approach to Climate Change Adaptation Activities and Annex 5.4 GET Finance for Desalination Projects). Specific tools shall be developed for:
  - Eligibility assessment (Desalination technology screening criteria – KPIs and climate resilience outcomes);
  - Impact assessment (indicators); and
  - Measurement, Reporting and Verification (“MRV”) arrangements.
- Identify technical KPIs, which should be representative of the resource efficiency performance, climate resilience and other GET criteria.
- Develop GET criteria taking into account the sustainability of various uses of desalinated water in the assessment criteria of desalination projects (to avoid situations in which

desalinated water is sent into leaky distribution networks that lose a large proportion of the treated water or into inefficient irrigation systems).

- Apply the framework to two potential investments being considered by EBRD in SEMED.

### **TASK 3: INVESTMENT OPPORTUNITIES & CASE STUDIES DEVELOPMENT**

The aim of this task is to pre-assess the feasibility desalination options and the associated investments or interventions in the region, to be agreed with the EBRD. The Consultant shall develop two case studies of good practices desalination investments (using EBRD investment appraisal criteria) based on specific EBRD projects. The EBRD will provide project background information for each case study.

Each case study should:

- Provide an overview of the pricing of water in a country;
- Provide key screening criteria in line with GET Handbook (Please refer to *Implementing the EBRD Green Economy Transition, Technical Guide for Consultants*);
- Establish the typical CAPEX/ OPEX structures;
- Assess the costs of providing additional desalinated water relative to other water efficiency measures such as leakage reduction and efficient irrigation;
- Analyse national regulation, plans and policy priorities (e.g. Nationally Determined Contributions) and reforms currently in place or necessary (also taking into account water tariff reforms).
- Develop guidelines/recommendations of how the project should be structured/ adjusted to meet GET criteria/ increase GET impact.

#### **Indicative Case Studies to be conducted**

**Case study 1** – EGYPT: Financing of water supply infrastructure with desalination as an alternative water source

**Case study 2** – JORDAN: Financing of a desalination plant as an alternative water source

#### **4. DELIVERABLES**

The Consultant will be requested to produce the following outputs and reports:

- [D1] Final Report covering the results of Task 1 and Task 2 (Microsoft Word™ and PowerPoint™)
- [D2] Background paper with the analysis of the two case studies

- [D3] Template model to assess GET impact indicators (Microsoft Excel™)
- [D4] EBRD internal workshop to present the results (Microsoft PowerPoint™): It is envisaged that a workshop will be organised at the EBRD to discuss the proposed conceptual framework and its practical implications.

Schedule & Deliverables	Content	Submission
<b>Programme of Work</b>	The Consultant shall submit by email to the EBRD the detailed programme of work to be carried out including initial sources of data and information to be collected and reviewed.	Within 1 week of the start of the assignment
<b>Inception Presentation and Conference Call with EBRD</b>	After completion of the tasks under the Task 1 and Task 2, the Consultant should organize a conference call to present the initial results (in Microsoft PowerPoint) and confirm with the EBRD if any adjustments are necessary.	Within 8 weeks of the start of the assignment
<b>Draft Final Report [D1] including:</b> <ul style="list-style-type: none"> <li>• 2 Case Studies [D2]</li> <li>• Template model to assess GET impact indicators (Excel) [D3]</li> </ul>	The Consultant shall submit via e-mail a Draft Final Report, covering all aspects of the assignment. The Draft Final Report shall be prepared using Microsoft Word.	Within 10 weeks of the start of the assignment
<b>Conference Call with EBRD</b>	To discuss comments on Draft Final Report, the three case studies and the template model	Within 1 week from the delivery of the Draft Final Report
<b>Final Report [D1]</b>	The Consultant should submit the Final Report (in Microsoft Word) in English to the EBRD.	Within 1 week following the comments from the EBRD on the draft Final Report
<b>Presentation [D4]</b>	Subject to the confirmation of the EBRD, the Consultant will prepare a presentation (in Microsoft PowerPoint) presentation in English to be held in EBRD headquarters to illustrate the main findings of the assignment.  The Consultant should submit also a presentation of up to 20 slides, excluding back-up material, summarising the findings and conclusions of the main report and should be prepared using Microsoft PowerPoint. The presentation should be submitted via email to the EBRD for comments.	Within 1 week of the delivery of the Final Report

## 5. IMPLEMENTATION ARRANGEMENTS

**Duration:** It is envisaged that the Project will be launched in January 2019. The duration of the Project will be 5 months. It is expected that the Consultant will commence work immediately on appointment.

**Data sources and visualisation:** Wherever possible the Consultant shall present findings as well-designed graphs, diagrams or tables, rather than as pure text, clearly indicating assumptions made and mentioning the sources of information. For more detailed review and analysis, the reader will refer to annexes where all data gathered shall be presented, in table format. All data gathered will be organised in a table format for easy review and analysis and presented in annexes to the reports. All reports shall be submitted in English and presented in both paper and electronic format using Word for Windows. All spreadsheets should be in Excel for Windows.

**Activities and Travel:** The Assignment will include desk-based research, stakeholder consultation and interviews (remotely). This work is a desk-based research only. Travel to EBRD CoOs is not envisaged. The Consultant will utilise all relevant existing studies, in particular the “MENA Regional Water Outlook, Part II Desalination Using Renewable Energy” Report, prepared in 2011.<sup>2</sup>

**Reporting:** The Consultant will report to EBRD Operation Leader in the Energy Efficiency and Climate Change team. The project will be implemented in coordination with the Municipal and Environmental Infrastructure Department, Environment and Sustainability Department, and Economics, Policy & Governance Department. Frequency and format of communications will be agreed by parties in advance.

**Inception of the assignment:** The EBRD will host a kick-off meeting in order to agree details, scope, activities and schedule. This will be held within 2 weeks from contract signing.

**Timing of deliverables:** A detailed programme of work shall be submitted with the technical proposal. Timing of all other deliverables as outlined in the table above.

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<sup>2</sup> Fichtner (2011) MENA Regional Water Outlook, prepared for the World Bank. Link: [http://siteresources.worldbank.org/INTMNAREGTOPWATRES/Resources/Use\\_of\\_Desalination\\_and\\_Renewable\\_Energy\\_to\\_Close\\_the\\_Water.pdf](http://siteresources.worldbank.org/INTMNAREGTOPWATRES/Resources/Use_of_Desalination_and_Renewable_Energy_to_Close_the_Water.pdf)