

KIB-TEK PRE-FEED STUDY TENDER TO DETAIL FSRU MOORING SYSTEMS

TECHNICAL SPECIFICATION



SCOPE, DESCRIPTION OF WORK AND DEFINITIONS

Section 1

1.1. THE SCOPE

The work involves the technical procedures and conditions regarding the proposals to be submitted for project development to establish a facility. It is aimed to use natural gas in the facility for electricity generation of the Turkish Republic of Northern Cyprus (TRNC). The project area, specified by the Cyprus Turkish Electricity Authority (KIB-TEK), covers the Teknecik Power Plant Bay.

1.2 DESCRIPTION OF WORK

To receive a proposal for the preparation and reporting of a Pre-FEED Study for KIB-TEK, to determine the most appropriate mooring type/s. This will be done by considering the current wavelength and wind climate conditions of the project area in order to connect the FSRU (Floating Storage and Regasification Unit) vessel **in the safest way to provide uninterrupted gas supply** to the power plants.

1.3. DEFINITIONS

- a) The Administration: Cyprus Turkish Electricity Authority (KIB-TEK)
- b) The Company: Referring to participating company in this tender
- c) The Proposal: The proposal being submitted by the participating company
- d) The Plant: FSRU, FSRU Mooring System
- e) FSRU: Floating Storage and Regasification Unit
- f) Tender Evaluation Price: The price at which the tender will be evaluated

1.4. THE PRE-FEED STUDY WILL BE CONDUCTED AND REPORTED AS FOLLOWS:

- i. The technical team from KIB-TEK, determined by the Administration, will hold a kick-off meeting with the Company to give detailed information about the "KIB-TEK Fuel Change Project". All existing reports and data will also be shared with the Company in order to be utilized in the preparation of the Pre-FEED Study report.
- ii. Existing reports, site data (Wavelength and Wind Climate Analysis, Bathymetry, Oceanography, Geotechnics, Tsunami Hazard Risk Analysis, Digital Elevated Layout Plan etc.) submitted by the Administration to the Company will be reviewed together with the KIB-TEK technical team. A "Gap Analysis" report, which notes the additional information and studies required to finalise the Pre-FEED Study report, will be prepared jointly by the Company and the Administration. Additional information and/or reports that the Company and the Administration deem necessary, will then be provided by the Administration.
- iii. With the input of information from the meeting with the Administration a provisional "Basis of Study" (BOS) document will be drafted including the following;
 - I. Determining the amount gas of LNG Terminal exit that KIB-TEK will need (Terminal throughput=MTPA);
 - II. Estimating the storage capacity of the FSRU with the Administration (m³);
 - III. Determination of potential sources of LNG supply;
 - IV. Determining the number of possible support vessels and where they will be deployed from;
 - V. Identifying any site constraints with the Administration that may drive the concept selection: nearby populations, environmentally sensitive areas, restrictions on navigation, etc;
 - VI. Determining whether the power plant will use dual fuel or not and inform the Company (for example, working with NG and HFO);
 - VII. Determination of the interruption period in the gas supply acceptable by the Administration (acceptable downtime);
 - VIII. Determining the Administration's opinion on the FSRU operational philosophy

- IX. Referencing existing studies and obtaining data;
- iv. The draft BOS created with the Administration will be reviewed, finalised and the study objectives will be established,
 - v. Developing concept LNG terminal design layouts (minimum 2, maximum 4) based on the terminal types identified in the BOS,
 - vi. Relative capital expenses (CapEx) and operating expenses (OpEx) will be established for each concept Mooring Systems design,
 - vii. A stakeholder meeting will be held with all stakeholders of the project, approved by the Administration, including the Company, to discuss the advantages and disadvantages of each applicable mooring concept (Client Charrette).
 - viii. For the next steps, a draft and final Pre-FEED report containing recommendations for the LNG terminal will be prepared and submitted to the Administration.

1.5. Pre-FEED Study Report;

The report will include the most basic elements featured in the table of contents, given in the order below.

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1.5.1 Below are some concept descriptions;

a) Design Basis

Mooring design basis should contain the baseline requirements for the design of a mooring system. It should include the following functional specifications and performance standards:

- i) Whether the mooring is dis-connectable*
- ii) Watch circle requirements*
- iii) Design service life*
- iv) Geotechnical conditions*
- v) Location as it pertains to availability/cost of mooring installation vessels*
- vi) Mooring design standard or Recommended Practice*
- vii) Owner specified design guidelines and philosophies*

b) Mooring Risk Assessment

The risk assessment should conform to the guidance found in ISO 31000 and API RP 2SK. The *ABS Guidance Notes on Risk Assessment Applications for the Marine and Offshore Oil and Gas Industries*, for the guidelines for defining the concept of risk, describing the methods available to assess risk, and in performing successful risk studies should also be satisfied. Since the objective of the risk assessment is to demonstrate the fitness of the mooring system and the associated structure or systems of interest via risk, the assessment should clearly define the risk categories (e.g., risk matrix) and acceptable risk levels.

c) Numerical Simulation Models

Numerical simulation is one of the key methodologies used for the design and reassessment of mooring systems. The development, updating and maintenance of numerical models allows for the timely assessment of mooring system behaviour in the event of mooring damage or state change. For example, the vessel may be operated at different drafts and trims compared to those assumed during the design stage.

In assessing the consequence of particular component failures to a mooring system (single line failure, multi-line failure), numerical simulation can be very effective. The maintenance of an accurate numerical model of a mooring system allows for prediction of behaviour under degraded conditions.

Numerical models may also play a role in the overall verification of system global response where real-time monitoring of the environment, vessel position and mooring system parameters are used to benchmark the numerical models.

Access to current numerical models are especially important for emergency response considerations. In addition, numerical models allow rapid evaluation after abnormal inspection findings.

1.6 Cost Analysis: The budget required for the detailed design of possible facilities; Mooring Systems and the basic pipeline (sea and land), should be calculated and submitted to the Administration, in the Pre-FEED Study report.

1.7 Valid currency in the proposal will be EURO (€).

1.8 The Company participating in the tender should present at least two (2) similar and completed projects. The facility/facilities in the installation phase during the date of the proposal submission, will not be accepted as a reference. A detailed description of the project, its scope and the contact information of the project client is to be provided in the reference. If required, the Administration may directly contact the client of the reference project whose contact information is provided and visit the facility at the expense of the Administration.

1.9 The Company is obliged to present signed and stamped versions of its own catalogue and/or documents together with the proposal. The catalogue and/or documents to be presented should be original. Each page should be signed and stamped by the Company. The first or last page of the signed and stamped catalogue and/or documents should also contain the full name of the authorized person and their contact number.

1.10 Teknecik Power Plant Bay, The Wavelength and Wind Climate Analysis Report will be provided both in Turkish and English languages in the tender dossier for information purposes to the successful tenderer. A detailed Bathymetry Map (digital), Oceanographic, Geophysical-Geological, Geotechnical Reports (Ground Study Report), Tsunami Hazard and Risk Analysis Report and Teknecik Power Plant Digital Site Plan information will also be shared with the winning Company.

1.11 The facilities to be proposed will be designed specifically considering **the Maximum Deep Wave Height** value available in the Wavelength and Wind Climate Analysis Reports. The facilities will be resistant to natural disasters such as corrosion, wind, hose, tsunami, etc.

1.11.1 The Pre-FEED Study Report will be submitted to the Administration both in Turkish and English languages.

Section 2

- 2.1 The study will be carried out for Teknecik Power Plant Bay in Kyrenia, including all the details of a Pre-FEED Study engineering.
- 2.2 It is required to submit a report that fulfills all the requirements of a Pre-FEED Study. The report should include the description and analysis of all possible berthing systems known, in accordance with the berthing conditions of the FSRU vessel, which will **provide the safest and uninterrupted gas supply to the power plants** as requested by the Administration. Appropriate mooring methods identified in the Pre-FEED Study report should include; cost analysis, labor force (convenience and difficulty), construction time, technical properties, construction method and assigning construction location. These issues should also be presented as a table in the report for comparison purposes.
- 2.3 In the event that any of the Mooring Systems fails to provide uninterrupted gas supply or does not comply with the existing conditions, the technical reasons for this matter will be explained in the Pre-FEED Study report.