EXPRESSION OF INTEREST (EOI)

FOR

HIRING OF TECHNICAL CONSULTANCY SERVICES (EPMC) FOR CONSTRUCTION OF CARBONATED WATER INJECTION (CWI) SURFACE FACILITY INSIDE DIKOM WATER INJECTION STATION (WIS#DKM) UNDER DIKOM CHABUA FIELD OF OIL INDIA LIMITED (OIL) LOCATED IN DIBRUGARH DISTRICT (ASSAM, INDIA) ALONG WITH O&M OF THE CWI PLANT FOR FOUR (04) YEARS (EPC + O&M) AND EXCLUDING SOURCING AND SUPPLY OF LIQUID CARBON-DI-OXIDE (CO2).

EOI No.: EOI/PSS/CWI/003/2025

DESCRIPTION:

Hiring of Technical consultancy services (EPMC) for construction of Carbonated Water Injection (CWI) surface facility inside Dikom water injection station (WIS#DKM) under Dikom Chabua field of Oil India Limited (OIL) located in Dibrugarh district (Assam, India) along with O&M of the CWI plant for four (04) years (EPC + O&M) and excluding sourcing and supply of liquid Carbon-di-Oxide (CO2).

1.0 PREAMBLE:

OIL INDIA LIMITED (OIL), a Government of India Enterprise under the Ministry of Petroleum and Natural Gas, is a premier upstream Maharatna E&P Company engaged in the business of Exploration, Production & Transportation of Crude Oil & Natural Gas as well as production of LPG. Its Field Headquarters (FHQ) is at Duliajan, Dibrugarh district, Assam (INDIA) and Corporate Office is in Noida, UP (INDIA). OIL's operations are largely based in the North-Eastern parts of India particularly in Assam, Arunachal Pradesh, Nagaland, Mizoram and Tripura. Additionally, OIL operates in Rajasthan, Andhra Pradesh, Andaman and Kerala-Konkan and also has overseas presence.

2.0 OBJECTIVE:

OIL embarked on the development of a novel CO2 EOR (Enhanced Oil Recovery) technology, namely Carbonated Water injection (CWI), in the LK+TH reservoir (NHK438 Block) of Dikom Chabua field at Dikom Water injection Station (WIS#DKM). The project aims to assess CWI's feasibility in extracting undrained and bypassed oil reserves, offering advantages over traditional CO2 flooding methods, maximising oil recovery potential and generating additional revenue for OIL. The novel project is technically viable regarding the surface execution elements. However, it is associated with inherent risks from CO2-induced corrosion and geological leakage of CO2. These risks need to be practically assessed through controlled project execution, continuous monitoring, real time process optimization and mitigation measures. To field-implement this EOR technology, OIL decided to undertake a Pilot CWI Project. The reservoir simulation studies conducted by OIL's in-house experts formed the basis for undertaking the CWI Pilot Project.

Our aim also includes developing and implementing mitigation strategies throughout the project lifecycle to address any potential challenges, such as CO2 induced corrosion and CO2 breakthrough, leakage, and surfacing. By employing

these mitigation strategies, we intend to improve overall effectiveness & sustainability of the project and OIL's future CO2 EOR operations.

This EOI is floated to invite participation from the prospective vendors and thereby to submit their bids to carry out EPMC services required for construction and O&M of CWI surface facility at WIS#DKM by hiring the EPMC service through open tender at a later stage.

3.0 DELIVERABLES:

The bidder may be required to give a presentation to OIL on a later date after submission of EOIs on the possibility of rendering the services of "EPMC for CWI pilot project" of OIL to be hired through an open tender in the future.

4.0 EVALUATION CRITERIA:

The proposals received through this Expression of Interest (EOI) shall be evaluated based on the following criteria for OIL's future open tender for hiring EPMC service for CWI pilot project:

i. Technical details with solution & feasibility of implementation. This may include the requisite technical expertise required for carrying out detailed study to find out feasibility, recommendation and design of CWI surface facilities.
ii. Proven experience and track record of the bidder in executing similar projects.
iii. Cost-effectiveness and value for investment.
iv. Compliance with safety, environmental, and regulatory requirements.

5.0 SUBMISSION OF EXPRESSION OF INTEREST:

Interested parties are requested to submit their EOIs in electronic format to chabin_chetia@oilindia.in, dilowarh_laskar@oilindia.in or hard copy may be submitted to the following address no later than **19.07.2025:**

CGM-PSS (HoD)
OIL INDIA LIMITED
P.O. DULIAJAN-786602
DIST. DIBRUGARH, ASSAM, INDIA

The EOI shall include the following information:

i. Company profile, including relevant experience in similar projects.
ii. Technical feasibility and innovation of the solution.
iii. Track record of the bidder in executing similar projects.
iv. Outline of proposed methodology and approach.
v. Tentative Scope of Work, Terms of Reference and necessary specification with proposed methodology.

Note: Based on the inputs received from the prospective bidders, a Scope of Work will be prepared and forwarded to the parties for obtaining Budgetary Quotation for OIL's future open tender.

6.0 TIMELINE AND DELIVERABLES FOR EXECUTION IN FUTURE:

The mobilization period of the contractor's manpower under the hired services shall be completed within 45 days from the date of Letter of Award (LOA) to be awarded through a contract by open tender. As envisaged by OIL, the duration of the proposed EPMC contract shall be for 21 months from the date of LoA (Zero Date). The breakup of timeline shall be 07 Months for preparation of EPC tender followed by 03 months for award of EPC tender and then 11 months for EPC work as PMC.

An outline of the **Technical Aspects of CWI facility at WIS#DKM** is enclosed as **Annexure-I** of this EOI document. The prospective service providers may submit their offers in this EOI taking into consideration the contents of the **Annexure-I** enclosed.

7.0 GENERAL NOTES:

a) All documents/brochures submitted along with the EOI shall be self-certified and clear & legible.
b) The EOI is liable to be ignored in case of submission of any misleading/false representation.
c) OIL reserves the right to ignore any or all EOI bids, without assigning any reason thereof.

8.0 CONFIDENTIALITY:

All information provided during the EOI process will be treated as confidential and used solely for the purpose of evaluating submissions and thereby enabling OIL to prepare a final Scope of Work / Schedule of Rate for OIL's upcoming open tender for "EPMC for CWI pilot project in WIS#DKM".

Please note that this invitation does not constitute a commitment to award the project or provide any form of reimbursement for costs incurred during the preparation of the EOI.

Should you have any questions or require further clarification, please do not hesitate to contact us at chabin_chetia@oilindia.in /dilowarh_laskar@oilindia.in. We look forward to receiving your Expression of Interest and exploring the potential of working together on this important project.

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Annexure-I

TECHNICAL ASPECTS OF CWI SURFACE FACILITY AT WIS#DKM:

1.1. Fundamental Principles of the Novel Technology, CWI EOR:

Oil India Limited adopts various Improved Oil Recovery (IOR)/Enhanced Oil Recovery (EOR) techniques to increase production and enhance recovery from its ageing fields. In this effort, OIL is planning to adopt a novel EOR technique through use of Carbonated Water Injection (CWI) in one of its reservoirs at Dikom fields located in upper Assam area.

The principle of CWI-EOR technique involves the transfer of dissolved CO2 to the oil phase to improve the oil mobility and to cause oil swelling - thereby increasing the sweep efficiency. Incremental recovery by Carbonated Water Injection is achieved through various mechanisms such as oil swelling, oil viscosity reduction, formation of a new gas phase within the oil, wettability alteration, and interfacial tension reduction, all acting to varying degrees. Globally there is no known CWI EOR project carried out in reservoir scales. There has been study / experimentation on CWI in various Industry academic joint projects. In such studies (OIL has been a part of such a global Industry-Academia study project), CWI has been found to be a promising and cost-effective alternative EOR method compared to a full scale CO2 flooding.

In CWI-EOR, Carbon-dioxide (CO2) is used efficiently and only a small amount (6.2 % of CO2 in water) is required compared to full-fledged CO2 flooding.

1.2. Existing Surface Process Description:

Greater Dikom field, where the CWI Pilot project will be implemented is located at around 15 km from Dibrugarh Town in Assam and at 30 km from Duliajan. A new water injection station (WIS) at Dikom (WIS#DKM) has been completed for injecting low saline water / carbonated water having total capacity of 1500 KLPD and water injection is being done at surface pressure of around 110 – 130 KSC.

WIS#DKM has following existing facility:

I. High Pressure Injection Pumps: 4 nos. Injection pumps (2 Working + 2 Stand by) with discharge capacity of 31.25 KLPH at 130 KSC pressure.

II. Filtration, Treatment & Testing facility: 2 nos. filtration & treatment facility for low saline water and treated formation water & testing facility for the treated fluids, online analysers etc.

III. Storage Facility: 2 nos. 1500 KL tanks for storage of treated low saline water / treated formation water.

IV. Piping network: High pressure / low pressure piping network for injection pressure. 4” diameter high pressure injection manifold / header / Piping (Grade: 1500 class) is of Stainless-steel material.

V. PLC based Control system: Control system enabling one operator to control entire injection facility.

VI. Captive Power Generation: 2 nos. Gas engine driven power generating set (1 Working + 1 Stand by) of capacity 810 KW.

Note: The area for setting up CWI surface facility inside WIS#DKM is kept earmarked.

1.3. Technical Feasibility & Risk Assessment:

Carbonated Water Injection, besides being a novel CO2 EOR, also represents itself as unique in its surface requirements of machinery and equipment. The primary of them is the CO2 injection cum mixing pumps, which require to deliver the following:

- Successfully injecting/mixing liquid CO2 into injection water at 120-130Ksc pressure.
- Handle liquid CO2 at temperature ranging from sub-zero to around 20 degrees centigrade.
- Withstand potential CO2 induced corrosion effects.

2. Execution Philosophy for Field implementation

2.1. Plant design Requirement:

The overall CWI surface facility shall be designed for injection rate of 15 MT/day of CO2 in 05 Nos of injector well @75 MTD of CO2 for a period of 17 Years. However, Initial Injection requirement for purpose of EPC work shall be 15 MT/day of CO2 to be injected in 03 Nos of Injector well totalling 45MTD of CO2 injection for a period of 04 Years. OIL may at a later stage opt for augmentation of the facility for CWI in 05 wells @ 75 MTD as per the designed capacity vide a separate contract, if necessary.

To execute the CWI pilot project, the required amount of CO_2 for injection will be supplied in its pure liquid phase, through insulated road tankers to the project site. Upon arrival at the site, the liquid CO2 will be transferred through unloading pump into the storage vessel where stringent conditions of 18-22 kg/cm^2 pressure & -25°C temperature will be maintained.

An injection pump will draw suction from the storage vessel and deliver the CO2 into the injected water stream under pressure ranging from 110 to 130 kg/cm^2. The CO2, before mixing with the injected water stream, will pass through an Electric Heater that will raise its temperature to from -25°C to 10°C.

Additionally, a Ratio Controller will be employed to regulate the liquid CO2 concentration in the water injection stream, guaranteeing it remains above 6.2% by weight. A Static mixer will be utilized for proper mixing of liquid CO2 and Injection water.

Note: Liquid CO2 sourcing and supply for the project shall be in OIL's scope and hence excluded from the SOW.

2.2. Physical resources required for the project are:

2.2.1. Carbon-dioxide:

Liquid CO2 having temperature of -25 degree Celsius & pressure of 18 kg/cm2 will be supplied through road tankers from an external source. These road tankers will have a capacity ranging from 16 to 24 tons and adequately designed and insulated to maintain the liquid CO2 at a temperature range of -22 to -27°C and a pressure of 18 to 21 kg/cm². Liquid CO2 delivery to the envisaged CWI facility at Dikom is in OIL's scope.

2.2.2. Equipment:

The primary process equipment required at WIS#Dikom are:

- **Storage vessels**: These will be required for storing refrigerated CO2. Each vessel will be constructed using a thermally insulating material and will have a storage capacity of 80 m3. The operating parameters considered for the vessels are:
  - Operating Pressure: 18 ~ 22 kg/cm2g
  - Operating Temperature: (-) 20 to (-)25°C
  - Design Pressure: 30 kg/cm2g
  - Design Temperature: (-) 45°C
  - Proposed Quantity: 3 Nos.

- **Liquid CO2 Injection Pump**: This pump will be utilized to pump liquid CO2 into the existing injection water stream, operating under the following conditions:
  - Pumping pressure: 110-130 kg/cm2
  - Temperature (of fluid handled, CO2 liquid): (-)25°C
  - Flow Rate a single pump delivers:
    Normal Flow Rate: 2.5 m3/Hour for a single pump.
    Maximum Flow Rate: 3.5 m3/Hour for a single pump
  - Proposed Quantity: 3 Nos.

- **Electric Heater**: Before mixing with the injected water stream, liquid CO2 will pass through an electric heater which will raise its temperature to 10 °C.
  - Proposed Quantity: 1 No.

- **Ratio Controller**: The Ratio Controller will regulate the liquid CO2 concentration in the water injection stream, ensuring it stays above 6.2% by weight. It monitors both liquid CO2 and injection water flow rates, calculates the necessary mixing ratio, and adjusts the CO2 amount in real-time based on injection water flow rate changes.
  - Proposed Quantity: 5 Nos.

- **Static Mixer**: Static mixer is provided for proper mixing of liquid CO2 and Injection water.
  - Proposed Quantity: 5 Nos.

- **BOG System**: A refrigeration package condenses Boil-off CO2 from Storage tanks.
  - Proposed Quantity: 1 No.

3. Battery Limit:

The battery limit for the project is to be identified as the boundary walled premises of the Water Injection Station at Dikom (WIS#DKM).

4. Scope of Work for EPMC:

i. Site survey
ii. Basic Engineering
iii. Cost estimation based on Scope of Work (SOW), Material Take off (MTO), etc.
iv. Bidder Qualification Criteria for EPC + O&M tender for OIL, Loading / Penalty criteria
v. Preparation of Technical Bid Package (Preparation of Scope of Work (SOW) for EPC cum O&M tender for OIL's upcoming CWI facility in WIS#DKM, tender document preparation, etc.)
vi. Extend expertise service during detailed engineering, review and approval, procurement management, etc. (includes Plot Plan, P&ID, PFD, HAZOP, HAZID, SIL study, material and equipment selection, bill of materials, piping, etc.)
vii. Pre-bid meetings and reply to queries posed by bidder (Attend Pre-bid meeting and respond to queries, technical evaluation of offers, Price bid evaluation, recommendation to OIL for awarding EPC cum O&M contract to L1 bidder, etc.)
viii. Bid evaluation and subsequent recommendation to OIL for award of Contract
ix. Organizing kick-off meeting with the selected EPC cum O&M contractor.
x. Post award of LSTK Contract, PMC services shall include review of LSTK Contractor's detail engineering drawing/ documents as per approved Document Control Index, Construction management & supervision, Quality control, Document management and control.
xi. Construction supervision (including quality check) and commissioning assistance.

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