

Invitation For  
**EXPRESSION OF INTEREST**

**FOR SETTING UP**

**OFFSHORE FLOATING PLATFORM BASED  
OTEC AND DESALINATION PLANT**



**NATIONAL INSTITUTE OF OCEAN TECHNOLOGY  
VELACHERY-TAMBARAM MAIN ROAD, NARAYANAPURAM  
CHENNAI 600 100**

Ref. No. NIOT/SnP/EOI/01/2024-25

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National Institute of Ocean Technology (NIOT), Chennai, India invites Expression of Interest (EoI) from reputed firms for setting –up an ocean thermal gradient based renewable energy and desalination offshore plant of capacity 1 lakh liters per day and 165 kW gross power plant at about 4 km North East off Kavaratti Island in UT Lakshadweep.

**The Framework**

Ministry of Earth Sciences (MoES), Govt. of India has taken several policy initiatives in the quest for supplying clean drinking water and sustainable energy solutions for Indian Islands using ocean thermal gradient based technology developed by its Autonomous arm, NIOT. The Low Temperature Thermal Desalination (LTTD) technology utilizing ocean thermal gradient has been field tested and demonstrated in a series of working plants built in the Lakshadweep Islands. NIOT had successfully demonstrated the technology by generating fresh water through an experimental 1 MLD offshore plant based off Chennai. NIOT is also in process of establishing a land based ocean thermal gradient conversion (OTEC) powered desalination plant in Kavaratti Island of UT Lakshadweep.

It is now proposed to set up a pilot scale OTEC-Desalination plant of capacity 1 lakh litres per day of fresh water and 165 kW green energy using ocean thermal gradient principle on a platform to be located at about 1000 m water depth found close to 4 km off the coast of Kavaratti. By demonstrating the practicality and efficiency of OTEC technology, this initiative could pave the way for widespread adoption of renewable energy sources in small and eco-sensitive island communities in India also complementing the Blue Economy initiative and local job creation. Furthermore, the project's success could inspire further innovation in marine devices and offshore floating energy, contributing to global efforts to mitigate the impacts of climate change.

**Aim and objective**

The aim is to ascertain the interest of Firms/Consortia for participating in a competitive bid process for design, development and installation of an offshore platform mounted OTEC and desalination plant. The proposal would be funded in totality by the MoES. NIOT would provide the baseline design and it is IP protected.

The objectives of project are listed below.

- Design of process equipments and offshore components including floating platform for a 165 kW gross closed cycle OTEC modules and 100000 litres/day open cycle OTEC powered desalination plant.
- Demonstration of a pilot scale plant on a floating platform in more than 1000 m depth.

## The technology

Ocean thermal energy conversion (OTEC) system is a power generation system which uses the temperature difference between the warm surface seawater and the cold deep seawater of the ocean. It works on the Rankine cycle. The cycle consists of higher temperature reservoir, called source and lower temperature reservoir, called sink. When there is any thermal gradient, the heat transfers from higher temperature side to lower temperature side naturally. In an OTEC system, the warm seawater at 27-31°C acts as the source and the cold water at 6-7°C from a depth of 1000 m acts as the heat sink.

There are two types of OTEC systems considered for the proposed plant: (A) Closed Cycle OTEC – refer fig. 1; (B) Open Cycle OTEC – refer fig. 2. These types are briefly discussed below.

In a closed cycle OTEC (CC-OTEC), a low boiling point working fluid like ammonia, whose thermodynamic properties is suitable for the temperature range available to produce a power output, is evaporated using the warm seawater and condensed using deep-sea cold water. In this process, the cold working fluid is pumped to the evaporator from the ammonia tank using liquid ammonia pump. Evaporator is a heat exchanger where the heat energy of the warm surface sea water is utilized to vaporize the working fluid (liquid ammonia) and enters into the separator. A separator is connected between the evaporator and turbine to separate the liquid ammonia from dry saturated ammonia vapour. The dry saturated ammonia vapour from the separator is then sent to the turbine. The dry saturated vapour expands inside the turbine thereby generating electricity. The working fluid coming out of the turbine is fed to condenser which utilizes deep sea cold water to condense the working fluid and again fed to the liquid ammonia pump to continue the cycle. As the working fluid does not come out of the system, hence named closed cycle.

Open cycle OTEC (OC-OTEC) uses the warm surface seawater as the working fluid. In this process, the warm surface sea water is partially vaporized in flash chamber by maintaining a suitable low pressure of 30-35 mbar using a vacuum system. The generated vapour passes through the duct and drives the turbine, which is coupled with an electric generator to generate the electricity. The vapour then follows its path towards condenser where it gets condensed using cold water to generate fresh water. As the working fluid come out of the system, hence named open cycle.

Please see fig. 3 for illustration of the offshore OTEC plant.

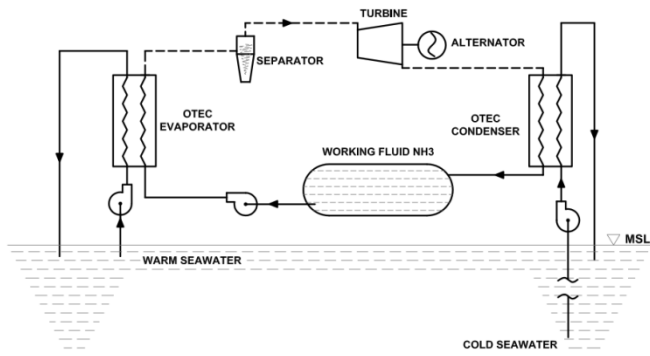


Fig. 1: Closed Cycle OTEC

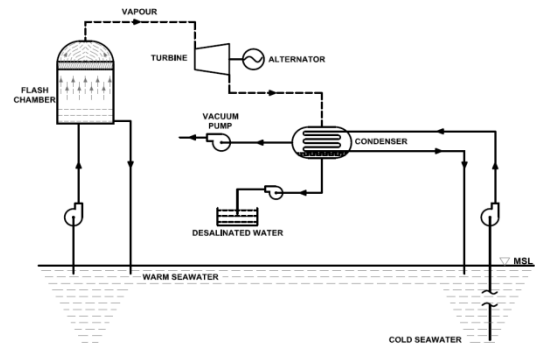


Fig. 2: Open Cycle OTEC

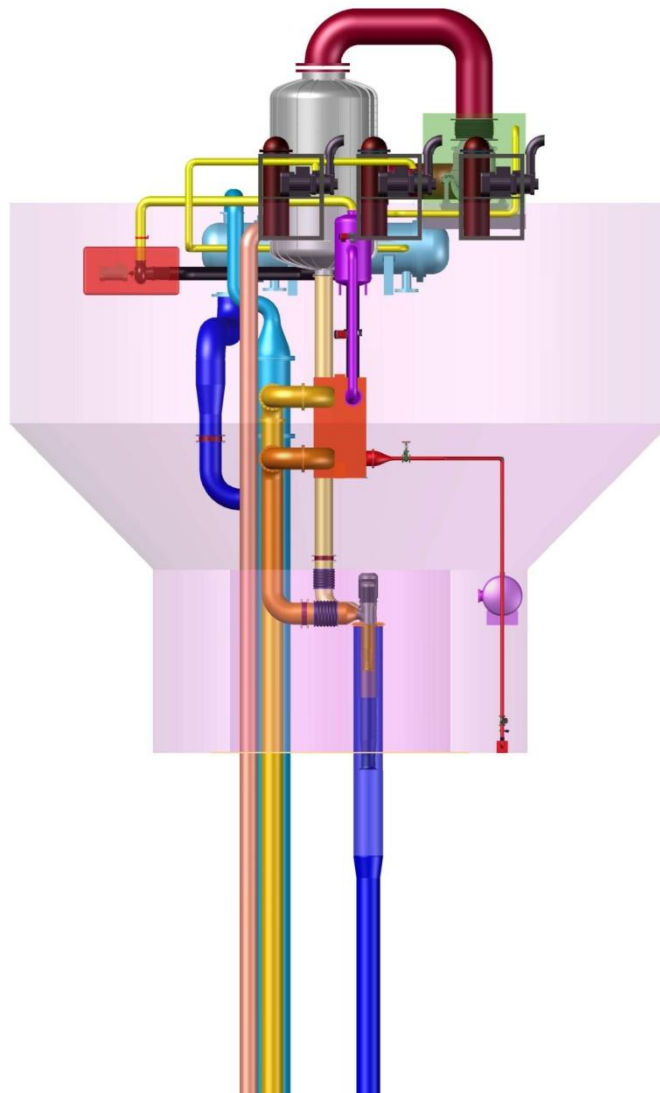


Fig. 3: Illustrative layout of the offshore OTEC plant

## **The Project & Broad Scope of work of the Contractor**

The project consists of the following elements:

1. Process design for both open cycle and closed cycle OTEC modules.
2. Design of offshore platform to house both open cycle and closed cycle OTEC modules
3. Design and manufacturing of all components of both the open cycle and closed cycle OTEC modules including turbines, condensers, evaporators, ammonia storage tanks, sea water pumps, vacuum systems, fresh water pumps, liquid ammonia pump, and piping, etc. while minimizing internal power consumption of the plant.
4. Design, supply and installation of electrical, instrumentation and control system.
5. Design and manufacture of the cold water HDPE pipe with its specific mode of construction with options available to choose between a single or bundle of pipes.
6. Design and manufacturing of offshore platform and obtaining necessary Class approvals.
7. Design and supply of mooring system for the offshore platform
8. Design and build the Interface between the cold water pipe and the offshore platform. The requirement also exists for easy separation of the pipe and moorings from the platform in bad weather conditions and reconnecting later.
9. Transportation of fabricated process equipments and platform to project site at Kavaratti.
10. Assembly and integration of all components of both the open cycle and closed cycle OTEC modules on offshore platform.
11. Butt fusion welding of deep sea coldwater HDPE pipe at site.
12. Mobilization of marine spread for deployment of HDPE pipe, erection of equipment.
13. Towing of offshore platform with all process equipment erected on it to required water depth.
14. Deployment of deep sea cold water pipe with all moorings attached and connecting to platform.
15. Commissioning of both the open cycle and closed cycle OTEC modules and operation for six months.
16. Data acquisition and analysis.
17. Design and build the transfer facilities for fresh water from open cycle OTEC plant and power generated by the plant to the shore.

## **Scope of NIOT in the Project**

NIOT would provide the baseline design and assist in obtaining local clearances required at all stages up to installation and commissioning.

## **Selection of the Contractor**

This EOI calls for firms to submit Expressions of Interest and which will be evaluated through a Select Committee to shortlist the firms meeting the eligibility criteria set down in this document.

Short listed firms will have the full opportunity to interact extensively with the NIOT project

team to understand the various aspects of the project and be briefed about the considerable design work already done by the Group. Sufficient time will be given to the firms to interact with NIOT team to make a reasonably detailed document to assess the design and cost of the project. The short listed firms will then be asked to submit a detailed technical and commercial proposal. NIOT welcomes technical as well as financial inputs from potential firms. The contractor could be selected based on a bid variable, which at the moment is considered to be the minimum grand required from NIOT to execute the project. However this will be firmed up at the time of floating the final tender.

### **Timeline for Completion:**

Timeline for the project completion is 3 years from the date of award of the contract to the successful bidder.

### **Eligibility Criteria for short listing of EOIs:**

It is understood that no single legal entity may have the experience and expertise to execute the project on its own, and may need to tie up with other contractors and/or design firms as consultants/sub-contractors. While this stage may be too early for the firm to reach a detailed agreement with the contractors (if any), NIOT would prefer that at least a preliminary understanding of co-operation defining the role of each sub contractor is set out in a document to form a part of the EOI document. Firms can also involve International firms to enhance their qualification and experience, but the main leader of the consortium must be a legal entity registered in India. The consortium should not have any firms/companies sharing land borders with India.

The Eligibility Criteria shall be the following:

### **Financial**

The purpose of assessing the financial soundness is to ensure that the financial standing on the whole does not have structural weaknesses that may result in the bidder's financial inability to perform, and to give an indication of the scope and value of work the bidder can undertake.

1. The average annual financial turnover of the firm or the consortium (the total financial strength of consortium partners will be added together to arrive at the average) during the last three years, ending 31-3-2024 should be at least Rs. 62 Crores for the purpose of assessing the financial strength. The documents should, duly be authenticated by a Chartered Accountant/Cost Accountant.
2. The net worth of the firm or the consortium should not be negative on "The relevant Date and also should not have eroded by more than 30%(thirty percent) in last three years, ending 31-03-2024 duly authenticated by a Chartered Accountant/Cost Accountant.

3. Preference will be given to those with experience in design and construction of offshore structures/platforms, costing over Rs 25 Crores and design of process plants over Rs 10 Crores.

## **Technical**

1. A firm or a member of the Consortium or the consultant sub-contractor must have a minimum of 05 years of independent experience with design of offshore platforms/ships, ship-building practices, and construction and installation of offshore platforms/ ships with detailed knowledge of Class Rules and costs estimations. A detailed list of the projects completed with their value must be submitted.
2. A firm or a member of the Consortium or the consultant sub-contractor must have a minimum of 05 years of independent experience with designing of Risers and similar components for the off-shore Industry with detailed knowledge of Class Rules and costs estimations. A detailed list of the projects completed with their value and role need to be submitted.
3. A firm or a member of the Consortium or the consultant sub-contractor must have a minimum of 05 years of independent experience in area of process engineering, design, materials, steam turbines, pumps and other process equipment and piping layout with costs estimation. A detailed list of the projects completed with their value and role need to be submitted.

## **Project Briefing Meeting**

A Project Briefing Meeting will be held at **11.00** hours on **30.08.2024** at NIOT Campus in Chennai. Interested firms who wish to attend send an email to [hvt@niot.res.in](mailto:hvt@niot.res.in) and address to Assistant Manager (Stores & Purchase) for confirming their participation. Prospective firms can also contact NIOT for any clarification regarding the EOI document.

## **EOI Documents:**

EOI shall contain the following documents:

1. Company Profile(s) including Organizational structure with details of ownership and evidence of incorporation
2. Evidence of financial capability, including annual audited accounts for the past three (03) years ending March 31, 2024. Certificate from Chartered Accountant for the Net worth Criteria.
3. Documentary evidences for all the technical and financial capabilities listed in eligibility

criteria

4. Detailed information on key technical personnel on role of the firms with their qualification and experience related to this project.
5. Legally enforceable document on the consortium, if applicable.
6. Conceptual Financial Model for the Project.
7. Project Methodology statement with timelines (including design basis report).
8. Evidence as detailed above in undertaking projects involving engineering design, construction and operation in the area of process engineering and off-shore industry.
9. Suggestions, if any, that can be considered for the project.

NIOT reserves the right to additionally seek further clarifications / documents from participating firms if necessary. NIOT also reserves all rights to reject any or all EOI's without assigning any reason.

### **Submission of EOI**

EOI should be submitted in a sealed envelope clearly marked "EOI for offshore based floating platform OTEC plant" to:

**Director**

**National Institute of Ocean Technology**

**NIOT Campus, Velachery-Tambaram Main Road Pallikaranai, Chennai – 600100**

**INDIA**

**Last date of submission is 19<sup>th</sup> September 2024**

Note:

1. All the submitted profiles will be scrutinized on the basis of documents and information furnished by company / industry along with the prescribed form as in Section 5. NIOT may obtain clarifications wherever required from the company or from the referred client list in the profile. Based upon the scrutiny, offers of those companies / industries that fulfill the pre qualification criteria and other conditions as stated above would be short-listed.
2. Tender document for all the above requirements will be issued only to technically and financially qualified potential bidders.
3. A contract will be forming part of tender document to be signed by successful bidders.



**1. PROFORMA FOR SUBMISSION OF PROFILE ABOUT THE BIDDER****1.1 Particulars of Applicant Company**

Name of the Company							
Registration No.							
Address						STD Code	
						Tel. No.1	
						Tel. No.2	
						Fax No.	
	City					Pin	
State			E-mail*			Web Address:	
Type of company (specify Y/N)	Government		Public Undertaking	Sector		Private Limited	
	Contractorship		Public Limited			Proprietorship	
Nature of Company (specify Y/N)	Parent Company		Affiliate company (if yes, Parent company needs to furnish guarantee)				

**1.2 Location of Offices in India**

S No.	Name of Head	Address	Numbers
1.			STD Code
			Tel. No.
			Fax No.
		City:	Mobile
		Pin Code:	E-mail
2.			STD Code
			Tel. No.
			Fax No.
		City:	Mobile
		Pin Code:	E-mail
3.			STD Code
			Tel. No.
			Fax No.
		City:	Mobile
		Pin Code:	E-mail

### 1.3 Particulars of Contact Persons

S No.	Name and Designation	Address	Numbers	
1.			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	
2.			STD Code	
			Tel. No.	
			Fax No.	
		City:	Mobile	
		Pin Code:	E-mail	

### 1.4 Organization Details

The bidder must provide the organizational information as given here under:

1. Contractor's Office.
2. Engineering Office.
3. Design and detailed engineering capability (in-house).
4. Procurement Services.
5. Sub-contracting.
6. Planning, Scheduling and Monitoring process followed.
7. Site Organization Chart.
8. Office organizational chart with names of key personnel.

## 2. Bidder's Experience in relevant areas of expertise.

S No	Description	Details		
1.	Name of the Project			
2.	Type of the project			
3.	Basis of the work	Individual/Consortium/Joint Venture		
4.	Description of the work			
5.	Details of the Single Contract:			
	a. awarded			
	b. Final Executed			
	c. Exchange Rate Considered			
6.	Name of the OWNER: details with name of Contact Person, Postal Address, Phone No., Fax, Email			
7.	Name of the design consultant for the project (if any): Details with name of Contact Person, Postal Address, Phone No., Fax, Email			
8.	Project Status			
	Starting Date			
	Actual Completion Date			
	Delays in Months, if any			
	Reasons for Delays, if any			
9.	Scope and Value of Work executed by the Bidder's Organization for the individual items	<b>Work details</b>	<b>Whether executed (Y/N)</b>	If yes, Value in Rs. Crores
		Residual Process Design		
		Detailed Engineering		
		Project Management		
		Procurement Services		
		Procurement, including supply		
		Construction:(Civil) (Structural)		
		Construction Supervision		
		Marine or Offshore Installation/ Erection / Deployment / Construction		
		QA/ QC		
		Pre-commissioning & Commissioning		
		Supervision of Commissioning		
10.	Description of the project/projects (Separate sheets may be attached explaining the experience in various projects that involved similar components)			

### 3. Qualification and Experience of Technical Personnel

The bidder must furnish the qualification and experience details of the company's personnel, especially in the following fields:

- Process engineering
- Engineering of various relevant disciplines
- Marine or Offshore Installation/ Erection/Deployment/Construction
- Project Management
- Planning / Scheduling
- Procurement Services
- Inspection and Expediting
- Stores Management
- Pre-commissioning/Commissioning
- Safety protocol
- Engineering design and Vetting.

#### 4. Financial Details

A. Audited Balance Sheets and Profit and loss Statements for the last 3 years:

B. Details of the Bankers:

Main Bankers:                      Name: Address: Phone / Fax:

Note: Interested parties should submit all back up documents such as fresh solvency certificate, complete audited reports, etc for the preceding three financial years:

<b>4.2 List of Enclosures and Any other Information that the bidder wishes to submit</b>	
(i)	
(ii)	
(iii)	
(iv)	
(v)	

#### Undertaking

This is to certify that I have gone through all the pages of the document. The applicant firm/ company understands and undertakes to abide by all the terms & conditions. Mere submission of profile does not confer any right on the firm to get the order and that the process enables short listing of firm meeting the project requirement of NIOT. It is further certified that the information furnished in the tender is true and correct. In any discrepancy is found later my tender is liable to be rejected.

Date:

Place:

Seal

Signatures:

Name:

Designation:

**5. CERTIFICATE OF RECOMMENDATION**

(To be filled by the Client Organization)

<b>S. No.</b>	<b>Details</b>	
1.	Name and address of the Organization	
2.	Contact Person name and contact no	
3.	Purchase or work order no and date	
4.	Works completed	
5.	Performance of contractor	Average          Good          Excellent
6.	a) No. of projects executed (between Rs. ___ and Rs. ___ crores) <b>Title of the Project/Order          Co./Sponsor          Total Order value</b>	
	b) No. of projects executed (more than Rs. ___ crores) <b>Title of the Project/Order          Co./Sponsor          Total Order value</b>	
7.	Timely completion of the project <b>Title of the Project/Order Scheduled Completion          Time over run (months)</b> <b>Date</b>	
8.	Any other information that Applicant Company wants to give	
9.	Authorized Signatory with date	

Name:

Designation:

Seal: