

(GLOBAL INVITATION OF EXPRESSION OF INTEREST)

# **NTPC Limited**

(A Government of India Enterprise)



Invites

Expression of Interest

(EoI)

From

**An Indian Company/their Consortium/Affiliates/Representatives**

For Setting up a

**Crematorium utilizing solar thermal technology, supplemented by a  
gas/alternative backup system as a pilot project**

## DOCUMENTS OF EoI

This EOI document comprises of the following sections:

- (i) Section I : EoI Information
- (ii) Section II : Introduction
- (iii) Section III : Instructions to the Applicants
- (iv) Section IV : Consideration of Response
- (v) Section V : Application Form and Annexures

# **Section – I**

## **EoI Information**

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

**DETAILED NOTICE INVITING EXPRESSION OF INTEREST (EoI)**

**EoI No. NTPC/PE/EoI-01/2023-24**

**Date: 11.03.2024**

NTPC is Inviting Expression of Interest for setting up a crematorium utilizing solar thermal technology, supplemented by a gas/alternative backup system, in close proximity to NTPC plant premises as a pilot project.

**DOWNLOAD AND TIMELINES FOR SUBMISSION OF EOI**

- a. Interested APPLICANTs may download the documents of EoI free of cost from [www.ntpctender.com](http://www.ntpctender.com) & <https://eprocurementpc.nic.in>
  
- b. **Last date for submission of EoI** : **07.04.2024**
  
- c. **Last date for queries/ seeking clarifications** : **01.04.2024**
  
- d. **Date of opening of EoI response** : **08.04.2024**
  
- e. **Response Validity** : **6 months from the last date for EOI Submission**

**1.0** NTPC encourages submission of EoI in soft copy. For consideration of EoI, APPLICANTs are required to e-mail softcopy of EoI, completed in all respect, through e-mail mentioned hereunder.

Email: [dipankarhalder@ntpc.co.in](mailto:dipankarhalder@ntpc.co.in)/[abalaji@ntpc.co.in](mailto:abalaji@ntpc.co.in)/[bvrao01@ntpc.co.in](mailto:bvrao01@ntpc.co.in)

**2.0** NTPC shall not be liable for any postal/ Mail delivery issue delays whatsoever in receipt of EOI documents and EOI received after the stipulated date and time shall not be entertained. EOIs submitted without supporting document will summarily rejected.

**3.0** NTPC reserves the right to reject or accept any or all applications, cancel/withdraw the EoI process without assigning any reason whatsoever and in such case, APPLICANT shall not have any claim arising out of such action. NTPC bears no responsibility or liability of any kind in reference to the EoI.

# Section - II

## Introduction

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### 1.0 ABOUT NTPC

- i. NTPC is India's largest energy conglomerate with roots planted way back in 1975 to accelerate power development in India. Since then, it has established itself as the dominant power major with presence in the entire value chain of the power generation business. From fossil fuels it has forayed into generating electricity via hydro, nuclear and renewable energy sources. This foray will play a major role in lowering its carbon footprint by reducing greenhouse gas emissions.
- ii. The total installed capacity of the company is 75,418 MW (including JVs) own stations include 27 coals based, 7 gas based, 1 Hydro, 1 Wind, 15 Solar PV and 1 Small hydro plant. Under JV, NTPC has 9 coals based, 4 gas based, 8 hydro, 4 Wind, 16 Solar PV and 1 Small hydro plant energy projects. The capacity will have a diversified fuel mix and by 2032, non-fossil fuel-based generation capacity shall make up nearly 30% of NTPC's portfolio. NTPC Limited produces around 400 billion units of electricity annually
- iii. NTPC Limited has reported a total income INR 1779.77 billion (21.6 billion USD) in the financial year 2022-23. NTPC group achieved a net profit of INR 171.21 billion (2.08 billion USD) in the financial year 2022-23 and has been consistently paying dividends to its shareholders.

### 2.0 INTENT OF THE EXPRESSION OF INTEREST (EOI)

- a) While cremation is an established ritual practice since ancient times and permits the cremation of dead body in daytime only, there is much more scope of solar crematorium in this ritual as solar power is also available in daytime only. Between 500 and 600 kg of wood are used to cremate a dead body, many trees are felled to meet this requirement. As a result, we are significantly contributing to global warming and polluting the atmospheric air much more. Therefore today, world is moving towards the sustainable energy sources which are renewable and biodegradable in nature. One of most sustainable energy

## **(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

sources is sunlight that too is inexhaustible and available free of cost. The heat (energy) produced is very clean with no pollutants. So above environmental problems can be the addressed very well by using solar crematorium.

- b) Recognizing the need of this requirement, NTPC is inviting expression of interest from Indian/foreign companies who can set up a crematorium based on the solar thermal technology in close proximity to NTPC Plant premises.
- c) The Cremation process involves burning a dead body at very high temperatures (800-1100 deg C) to ensure complete disintegration of the corpse. until there are only brittle, calcified bones left. This process takes approx. 90 to 120 mins.
- d) Proposal are invited for a Solar thermal energy based cremation system that can consistently maintain a minimum preheated temperature within furnace of the crematorium through circulating heat-transferring fluid/material required for cremation of the dead body. Having, a full-fledged back up system utilizing gas or other suitable alternatives designed for use in non-sunny hours. In case there is shortage (up to 30%) in attaining the required temperature during sunny hours using only solar thermal system also, part of this back up system may be used as supplementary back up to attain required temperature. The system shall also see that flue gases are conditioned and safe for dispersal into the environment.
- e) Indicative schemes for the aforementioned project is provided as Annexure-5 for reference. However, it is important to note that Applicants are encouraged to propose innovative approaches/alternative solutions that can effectively meet the temperature requirements for the cremation process using the solar thermal technology.
- f) To evaluate different technologies on a same platform, various design parameter, operational data and other information sought in EOI may be furnished as per Annexure-4. Further, applicant shall also provide typical range of these parameters for the earlier executed/reference projects.

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

- g) The initiative intends to showcase the potential of harnessing solar thermal energy from the sun for the cremation process. Through rigorous analysis of its techno-commercial feasibility, the project seeks to determine the viability of integrating solar thermal technology into crematorium facilities. By validating the performance of solar thermal systems in this context, the initiative endeavors to establish a pathway towards the development of sustainable and eco-friendly cremation systems. Ultimately, this endeavor not only highlights the practical application of solar energy in meeting critical societal needs but also underscores a commitment to maintaining eco-friendly practices.
- h) The interested applicants will submit the technical data/ information, guarantee parameters, the total estimated project cost and shall propose the financial contribution to be shared by themselves and by NTPC and other information as sought in Section-V.
- i) Based on techno-commercial analysis of the responses in the EOI and further discussions with interested parties, if it is found commercially feasible, NTPC may go for pilot installation / may not proceed with any project at this stage.
- j) NTPC reserves the right to implement the project either on nomination basis or through Request for Proposal (RFP) process amongst the shortlisted parties identified through this EOI Process.
- k) The response(s) received in the EOI/ information received post feasibility study will be utilized by NTPC for:
- a. Identification for suitable technologies which best fits the intended use cases
- AND/OR
- b. Formulation of specifications for various systems/stages required for execution of demonstration/commercial project(s)
- AND/OR
- c. Shortlisting of parties for forthcoming Request for Proposals (RFP) / tenders



**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

by NTPC for undertaking demonstration/commercial project(s)

- l) The Applicants may express their interest in respect of their offerings along with other inputs as indicated in relevant Annexures/formats.

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### 3.0 Eligibility:

Applicants or Applicants interested in collaborating and participating in this Expression of Interest (EOI) should possess the following qualifications:

**a) Solar Thermal Crematorium Developers:**

Applicant with an experience in developing and successfully pilot-installing a solar thermal crematorium.

OR

**b) Crematorium Manufacturers/Supplier:**

Applicant should be Crematorium manufacturers/supplier and should be ready to associate with a solar thermal technology developer/supplier.

OR

**c) Solar Thermal Technology Developer/Supplier:**

Applicant should be solar thermal technology developer /supplier and should be ready to associate with a Crematorium manufacturer/supplier.

OR

**d) EPC Developer**

Applicant should be developer who should be ready to associate with cremation manufacturer/supplier and solar thermal technology provider/supplier.

**Note:**

All applicants participating in the EOI, either individually or through association must be able to provide evidence to support their claims regarding experience as indicated in the above clauses.

In the case of applicants falling under categories (b), (c) and (d), they shall include a tentative list of vendors with whom they are willing to associate shall be mentioned in the Expression of Interest (EOI).

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### 4.0 Indicative Role and Responsibilities of Parties for Pilot project

The indicative roles and responsibilities of the parties under the project shall include but not limited to the following:

#### **NTPC's Role:**

- a. Land for installation and commissioning of the system.
- b. Facilitate the water supply requirement.
- c. Facilitate the applicant in applying for statutory clearances for the project
- d. Facilitate the installation and commissioning of the system.
- e. Support in data collection and analyzing the performance of the system during the testing and subsequent operations.

#### **Applicant's Role**

- a. Design, engineering, manufacture, supply, erection, commissioning and operating of solar thermal based crematorium based on selected technology as a pilot at identified location.
- b. Supply, erection, commissioning and testing of necessary infrastructure, associated electrical, civil/Structural, control and instrumentation and other accessories as required for completion of the plant.
- c. Construction of the cremation building for furnace and installation of the Solar collectors on the top of the building (if required).
- d. Complete civil, structural, architectural works including survey, drainage, fencing and boundary wall etc.
- e. Any other systems as required for completion of the system.
- f. Routine maintenance and operation of the systems for a period of 3 years from the date of commissioning.
- g. Ensuring that the complete system shall be odorless, applicable emission norms compliant, having an aesthetic environment with noise level in permissible limits.
- h. Providing all treatment systems to prevent discharge of harmful substances.

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

- i. Collection and analyzing the performance of the system during testing and subsequent operation.
- j. Getting required statutory clearances for installation and operation of the system
- k. Sharing the system level information for comprehensive understanding of the system.

## **Section - III**

### **Instructions to the Applicants**

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### 1.0 The Applicants should note that:

- a. Language of the responses to Eol or any query/clarifications/correspondences shall be in English only.
- b. For expression of interest, Application Form and Annexures given in Section-V shall be duly filled and sent to NTPC by the APPLICANT in soft copy.
- c. Applicants should go through Section-I and Section-II thoroughly before filling and submitting the application form and annexures in Section-V.
- d. Applicants shall mention the name and contact details of two persons, with complete address, phone number and email id.
- e. NTPC Ltd. may, at its sole discretion, ask for additional information/ documents and/ or seek clarifications from the Applicant(s) after the Deadline for submission of response, inter alia, for the purpose of removal of inconsistencies or infirmities in their responses.

### 2.0 Enquiries and clarifications

Any clarifications on the Eol may be sought to the following via e-mail:

To:

Dipankar Halder, AGM, PE-Electrical, Email: dipankarhalder@ntpc.co.in

Balaji Allupati, Sr.Manager, PE-Electrical, Email: abalaji@ntpc.co.in.

Venkateswara Rao Bitra, DGM, PE-Electrical, Email : bvrao01@ntpc.co.in

### 3.0 Corrigendum

At any time before the last date of submission of Eols, NTPC may, for any reason, whether at its own initiative or in response to a clarification requested by an Applicant, modify the Eol document. The amendment will be posted on the website and will be binding on the Applicants and the Applicant will give due consideration to the same, while they submit their Eols, and would invariably enclose documents/ information, as required, on account of the amendment, as a

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

part of the Eol. NTPC may, at its discretion, extend the deadline for the submission of Eols.

### 4.0 Preparation of the response to Eol

The application of Eol consists of the Annexure -1, 2, 3 & 4 of Section-V

### 5.0 Validity of the responses

The Applicant shall submit the responses which shall remain valid up to six (6) months after the response Deadline ("Response Validity"). NTPC reserve the right to reject any response, which does not meet the aforementioned validity requirement.

NTPC may solicit the Applicant's consent for an extension of the period of validity of the response. The request and the response in this regard shall be in writing. In the event any Applicant refuses to extend its response validity as requested by NTPC, NTPC shall terminate processing of such Applicant's responses. An Applicant accepting NTPC request for validity extension shall not be permitted to modify its response.

### 6.0 Submission of the response to Eol

The responses to the Eol are to be submitted in soft copy via below e-mail format

To: [abalaji@ntpc.co.in](mailto:abalaji@ntpc.co.in)

Cc to : [dipankarhaldar@ntpc.co.in](mailto:dipankarhaldar@ntpc.co.in) , [bvrao01@ntpc.co.in](mailto:bvrao01@ntpc.co.in)

**Ref. Eol No.** \_\_\_\_\_ **Dt** \_\_\_\_\_

**Submitted to:**

*Name, designation & address of the concerned officer at NTPC.*

**Submitted by:**

*Name, address & contact no. of the Applicant*

All the pages of the response should be duly stamped and signed by the authorized signatory. The responses to the Eol should be submitted within the Deadline at the address provided in the Section-I of this Eol.

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### **7.0 Costs and expenses towards response to Eoi**

The Applicants shall be responsible for all the costs associated with the preparation of the response and participation in discussions and finalization & execution of the documents related with this Eoi, NTPC shall not be responsible in any way for such costs, regardless of the conduct or outcome of this short-listing/ selection process.

### **8.0 Disclaimer**

This Expression of Interest (EOI) has been prepared by NTPC Ltd. for response from Indian/Global Company/their Consortium/Affiliates/Representatives for setting up a Pilot Project pilot of Solar thermal based crematorium with a complimentary backup from gas or any other alternative.

In submitting the response to the EOI, the Applicant certify that it understands, accepts, and agrees to the disclaimers on this page. Nothing contained in any other provision of the EOI nor any statements made orally or in writing by any person or party shall have the effect of negating or superseding any of the disclaimers set forth herewith.



## **Section-IV**

### **Consideration of Response**

## (GLOBAL INVITATION OF EXPRESSION OF INTEREST)

### 1.0 Responsiveness check

The responses submitted by Applicants shall be scrutinized and may be rejected in following conditions-to establish interest in setting up of a Pilot Project of Solar thermal based crematorium with a complimentary backup from gas or any other alternative. submitted by Applicants shall be scrutinized to establish interest in setting up **Solar Thermal Crematoriums**. Responses shall be deemed non-responsive for following reasons:

- a. Responses that are incomplete, i.e. not accompanied by any of the applicable formats inter alia covering letter, power of attorney, applicable undertakings, provided in more details at annexure in Section-V;
- b. Responses not signed by authorized signatory and / or stamped in the manner indicated in this Eol;
- c. Material inconsistencies in the information/ documents submitted by the Applicant
- d. An Applicant submitting more than one response to this Eol either itself or through an affiliate or subsidiary company;
- e. Response validity being less than that required as per Clause 5 of section-III of this Eol;
- f. Response being conditional in nature;
- g. Response not received by the response Deadline;
- h. Response having Conflict of Interest;
- i. Applicant delaying in submission of additional information or clarifications sought by NTPC, as applicable;

All bids that shall meet the responsive check requirements set out above in this section of the Eol document shall be considered as responsive. In case of non-

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

submission of relevant details as above, the responses may be considered as “**Non-responsive**”, at the sole discretion of NTPC and will not be considered further.

## **Section-V**

# **Application Form & Annexures**

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

**Annexure-1**

**FORMAT FOR COVERING LETTER CUM UNDERTAKING**

(The covering letter should be on the Letter Head of the Applicant)

Date : \_\_\_\_\_

Place : \_\_\_\_\_

To,

.....

**Sub.: (INVITATION FOR EXPRESSION OF INTEREST)**

**Ref.: Eol No. \_\_\_\_\_, dated \_\_\_\_\_ (the "Eol")**

Dear Sir,

We, the undersigned ..... [insert name of the "Applicant"] having read, examined and understood in detail the **(INVITATION FOR EXPRESSION OF INTEREST)**.

We confirm that neither we nor any of our Parent Company/ Affiliate/ Ultimate Parent Company has submitted response other than this response directly or indirectly in response to the aforesaid Eol.

1. We give our unconditional acceptance to the Eol, issued by NTPC, as amended. In token of our acceptance to the Eol, the same have been signed & stamped by us and enclosed to the response. We hereby confirm that the provisions of the Eol shall be binding on us.
2. We have submitted our response strictly as per provisions and formats of the Eol, without any deviations, conditions and without mentioning any assumptions or notes.
3. We hereby unconditionally and irrevocably agree and accept that the decision made by NTPC in respect of any matter regarding or arising out of the Eol shall be binding on us. We hereby expressly waive any and all claims in respect of Eol process. We confirm that there are no litigations or disputes against us, which

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

materially affect our ability to participate or function under the obligations with regard to Eol.

4. Details of the contact person are furnished as below:

Name :

Designation:

Address:

Contact numbers:

email id:

5. We are enclosing herewith the entire response containing duly signed formats in electronic format sent via email to: [abalaji@ntpc.co.in](mailto:abalaji@ntpc.co.in) as per the Eol for consideration.

6. It is confirmed that our response is consistent with all the requirements of submission as stated in the Eol and subsequent communications from NTPC, if any.

7. The information submitted in our response is complete, strictly as per the requirements stipulated in the Eol and is correct to the best of our knowledge and understanding. We would be solely responsible for any errors or omissions in our response.

8. We confirm that all the terms and conditions of our response are valid for acceptance for a period of six (6) months from the response Deadline.

9. We confirm that we have not taken any deviation so as to be deemed "**non-Responsive**" as stipulated in Section-IV of this Eol.

10. We understand that you are not bound to accept any response you receive.

11. We declare that our firm is neither put on Holiday or Blacklisted by any Government/PSU/Private Firm or Financial Institution.

We remain,

Yours sincerely

(Name, Designation and Signature of Authorized Person in whose name Power of Attorney is issued)

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

**Annexure-2**

**APPLICANTS ORGANISATION DETAILS TO BE SUBMITTED BY APPLICANT**

**(Note: Documents in support of meeting the respective requirement shall be submitted by the Applicant. In case of collaboration, both organizational details shall be submitted)**

**1.0 Applicant's Organization details**

- i. Name of the Company/Lead Partner of Consortium:
- ii. Legal status of the Company/Consortium:
- iii. Brief description of the Company/Consortium including details of its business groups/subsidiaries/ affiliates:
- iv. Existing Manufacturing facilities – Locations, Capacity
- v. Date of Incorporation:
- vi. Date of Commencement of Business:
- vii. Full address including Telephone nos. / Fax nos.:
  - a. Registered Office:
  - b. Head Office:
  - c. Address for communication:
  - d. Contact Details:
  - e. Office Address in India, if any:
- viii. Collaborations/tie-ups with manufacturer (if applicable),
- ix. Details of Indian parties, if any for installation, supply, Services
- x. Financial data of Organization (Attach Relevant document in proof of same)

Applicant is requested to submit Annual financial turnover during the last three (3) Preceding Financial years. Applicant to submit audited balance sheet and Profit and loss account for the above three financial years.

	Financial year 2022-23	Financial year 2021-22	Financial year 2020-21
Turnover			
Net worth			
Profit			

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

**Annexure-3**

**(Note: Documents in support of meeting the respective requirement shall be submitted by the Applicant. In case of collaboration, both organizational details shall be submitted)**

**1. Technical information to be Submitted by the Applicant:**

Applicant shall duly furnish the following information.

**i. About the Technology and technology Provider**

Applicant shall fill the required details and attach relevant documents as per Table-1, Clause-A and Clause-B, Annexure-4.

**ii. About the Reference plant**

Applicant shall fill the required details and attach relevant documents as per Table-1, Clause-C, Annexure-4.

**iii. About Proposed Pilot Project**

Applicant shall fill the required details and attach relevant documents as per Table-1, Clause-D, Annexure-4.

**2. Budgetary Cost:**

Estimated total capital investment for the pilot project with cost breakup of all major components preferably as listed below along with scope of supply and services, inclusions, exclusions, terminal points, facilities required at site, tentative project schedule:

a) Solar Thermal System

- i. CSP system which includes the Solar Dish and the Receiver and tracker
- ii. Heat Transferring fluid/ material
- iii. Storage Tank and piping system
- iv. Installation and Commissioning

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

- b) Cremation System
  - i. Furnace
  - ii. Chimney, Foundations, ducting and Piping System
  - iii. Air pollution control
  - iv. Control System
  - v. Installation and Commissioning
- c) Development of site
- d) Construction of civil building
- e) Miscellaneous items/systems.
- f) Estimated Annual O&M cost breakup along with spares and consumables

**Note:** Applicant shall separately mention taxes, duties, freight, insurance applicable for above items/project.

Applicant shall mention budgetary cost equipment supply for Indian item and imported item separately.

**3.0 Project Timeline:**

Applicant shall mention project completion period from award of job till Commissioning and Test Run with necessary details.

**4.0 Validity:**

Applicant is requested to mention validity of the proposal submitted.

(Sign & Company Seal)

Authorized signatory



**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

**Annexure-4**

**Table-1**

**Technical Specification Data**

**(To be submitted by the Applicant as per Clause no.1 of Annexure-3)**

<b>Sl. No.</b>	<b>Description</b>	<b>Applicant to fill</b>
<b>(A) About the Technology Provider</b>		
1.	Type of technology proposed by Applicant	
2.	Whether Technology is owned by Applicant	Yes/No
a)	If no, Name of Technology owner/ developer/ IP Owner	
b)	Registered office of Technology owner/ developer/ IP Owner	
c)	Whether Applicant has technology tie up/ collaboration with Technology owner/developer/ IP Owner	Yes/No (Attached copy of Technologytie up/ collaboration agreement)
d)	Validity period of agreement	
<b>(B) About the Technology being proposed</b>		
1.	Detailed write up of the proposed Solar Thermal Crematorium including basic principle, major operating conditions/parameters, input requirements (power consumption, gas quality & quantity etc.), startup time, Cremation time, safety and shutdown procedure etc.	
2.	Basic scheme of proposed system	
3.	Reference list of Cremator / CSP system presently in service	
4.	Best use case, Merits and Demerits and limitations of the technology	
5.	Temperature till which solar contribution shall be available to achieve the preheating temperature	
6.	Requirement of Gas/Any other backup system contribution to achieve the preheating temperature and maintaining the furnace temperature as desired	

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

7.	Details of backup system	
8.	Guarantee / Warranty offered for the system	
9.	Details of effluent generation	
10.	Overall Efficiency and parameters affecting efficiency/ performance	
11.	Any other relevant details which applicant would like to highlight about its technology (as applicable)	

**(C) Details of reference pilot/commercial Installations**

1.	Name of project where Applicant/ Its Collaborator/ associate installed / is installing Solar CSP/Cremator	
2.	Name and address of owner of the system	
3.	Scale of plant	(Commercial/ pilot plant)
4.	Design Temperature and capacity of Solar component	
5.	Date of award	
6.	Date of completion	
7.	If installation not yet completed, Present status and date of expected completion	
8.	Scope of work of Applicant (Furnish copy of LOA)	
9.	Equipment wise Break up and major operating conditions/parameters, input requirements (power consumption, gas quality & quantity etc.), start-up time, Cremation time	
10.	List of other utilities with quantity	
11.	List of equipment and capacity including handling, conveying, and processing system	
12.	Land Footprint	

**(D) Details of the Proposed Pilot**

	Description	Details
<b>A. Solar Reflector</b>		
<b>A.1</b>	<b>GLASS MIRROR</b>	
	Reflector Material	
	Reflector dimensions (HxWxD)	

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

	Shape	
	Thickness of glass	
	Reflective coating	
	Specular reflectivity	
	Edge Protective coating	
	Glass mirror strength and durability applicable standards	
<b>A.2</b>	<b>Silver reflective Film</b>	
	Material	
	Substrate thickness	
	Shape	
	Reflective Coating	
	Reflectivity Secular	
<b>A.3</b>	<b>Others</b>	
	Gross Collector Area	
	Aperture Area	
	Absorber Area	
	Optical Efficiency	
	Concentration Ratio	
	Maximum Efficiency	
	Angle of inclination permitted	
	Collector heat loss coefficient [w/m <sup>2</sup> K]	
	Collector performance Ratio	
<b>A.4</b>	<b>Support Structure</b>	
	Material	
	Shape	
	Protection from Corrosion	
	Strength and Durability	
	Fixing of Mirrors methodology	
<b>B. Receiver</b>		

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

	Receiver Material	
	Design shape	
	Thickness	
	Diameter	
	Absorptivity	
	Emissivity	
	Glass cover Material	
	Transmittivity	
	Thickness and diameter	
	Flow rate	
	Maximum operating pressure	
	Stagnation temperature	
	Heat loss coefficient	
	Hot insulation provided	
	Durability	

**c. Process Fluid**

	Process Fluid	
	Peak operating temperature of Fluid	
	Peak operating pressure	
	Appearance	
	Composition	
	Normal boiling point	
	Flash Point	
	Auto Ignition temperature	
	Coefficient of Thermal Expansion	

**d. Tracking System – If Applicable**

	Mechanism	
	Control logic	
	Accuracy	
	Details of Electrical and mechanical components	

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

<b>e. Balance of System</b>		
<b>e.1</b>	<b>Heat Transfer Pipe</b>	
	Design	
	Material	
	Size	
	Details of Insulation layer and material	
<b>e.2</b>	<b>Circulation pump</b>	
	KW rating	
	Flow	
	Pressure	
<b>e.3</b>	<b>Storage tank</b>	
	Type	
	Material	
	Storage Capacity	
<b>f. Others</b>		
1.	Preheating Temperature for the furnace Solar thermal System	
2.	Required Solar collector Area	
5.	Minimum Solar irradiation Required	
6.	Temperature attained with the Solar thermal system	
7.	Energy attained with the solar thermal system	
7.	Any backup system is required for attaining the preheat temperature, if yes please provide the temperature and the energy from backup system	
8.	Requirement of the gas/alternative for achieving the preheating temperature	

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

9.	Details of the backup system	
11.	Quantity of fluid required	
12.	Process flow diagram	
13.	Required Footprint	
14.	Start up time/ Complete cremation time	
15.	Expected life of entire project as a whole (Years)	
16.	Annual Maintenance requirement Frequency and spare details	
17.	Consumables	
18.	Flue conditioning system proposed	
19.	Any other information.	
<b>f. Relevant Information</b>		
	Any other relevant details which applicant would like to highlight/share about its technology (as applicable)	

**e) Technical data sheet for Cremator:**

1.	Primary Chamber Temperature	
2.	Secondary Chamber Temperature	
3.	Furnace Chamber inner dimensions	
4.	Furnace Chamber outer dimensions	
5.	Furnace standby temperature	
6.	Time required to achieve standby temperature from ambient of 20 deg.	
7.	Furnace Temperature during the cremation process	
8.	Furnace outside/casing temperature	

**(GLOBAL INVITATION OF EXPRESSION OF INTEREST)**

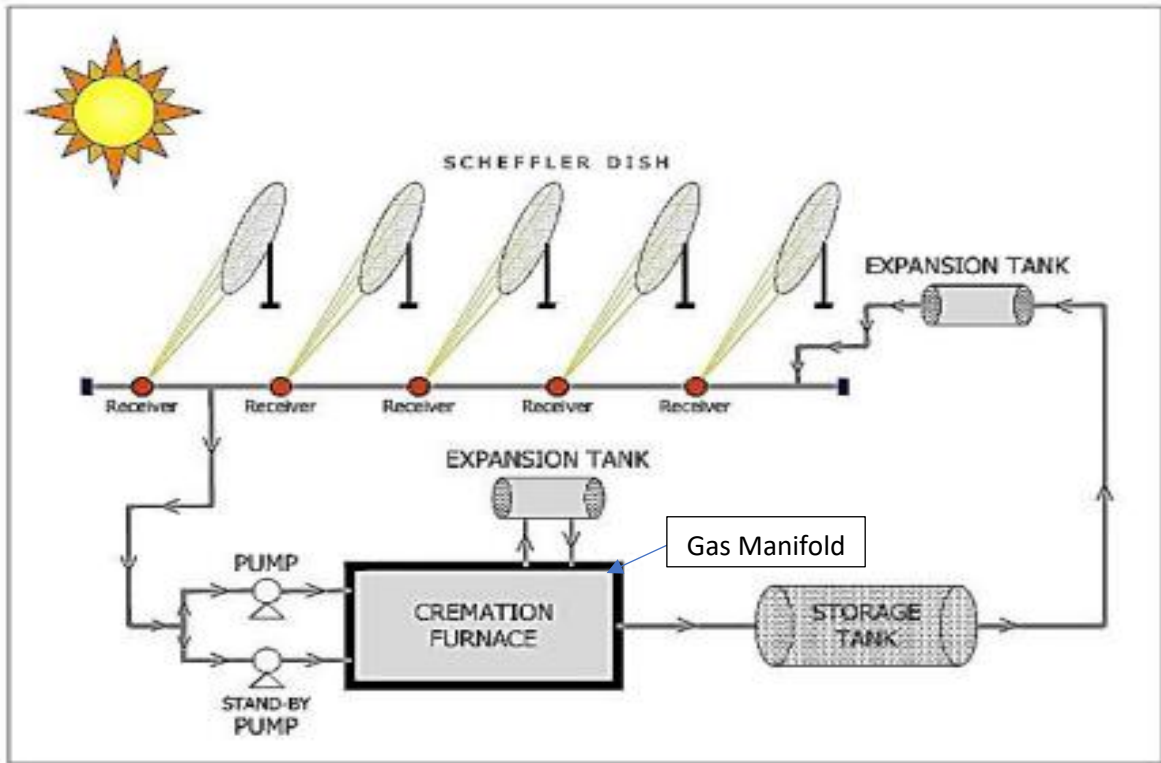
9.	Type, thickness and combination of insulating material considered.	
11.	Cooling period required for collection of cremation remains. (temperature below 40 deg)	
12.	Flue/exhaust temperature expected	
13.	Flue composition expected. (PPM, SOX, NOX)	
14.	Flue gas conditioning system considered	
15.	Auxiliary system power requirement	
16.	Source of Auxiliary power considered.	
17.	Details of conveying system considered	
18.	Total Heat energy requirement considered and basis of calculation	
19.	Details of Thermal Insulation – Internal and external	
20.	No. of Gas cylinders required	
21.	Gas pipe line details	
22.	Burner system	
23.	Dilution system details	
24.	Combustion air supply system details	
25.	Venturi Scrubber, cyclone separator and mist eliminator details	
26.	Activated carbon absorption unit	
27.	Height of chimney required	
28.	LPG consumption	
29.	Maintenance and consumable requirement	
30.	Area Required	

(GLOBAL INVITATION OF EXPRESSION OF INTEREST)

**Annexure-5**

**Indicative Scheme for Solar Thermal Crematoriums.**

**(Scheme-I)**



**(Scheme-II)**

