

भारतीय उष्णदेशीय मौसम विज्ञान संस्थान, आईआईटीएम

Indian Institute of Tropical Meteorology, IITM

Minutes of the Discussion Meeting (Notice No. PS/125/16/2026/CC/DM) and subsequent email circulations for - Design, Development, Installation and Commissioning of the Cloud Chamber Research Facility and its Infrastructure at IITM, Pune as a Turnkey Job

The discussion meeting for “Design, Development, Installation and Commissioning of the Cloud Chamber Research Facility and its Infrastructure at IITM, Pune as a Turnkey Job” (Notice No. PS/125/16/2026/CC/DM) was convened at Sikka Hall on April 20, 2026, from 1130 hrs in hybrid mode (online + offline). And subsequent email circulation took place after that as well.

The email circulation took place with all members of both committees.

The following companies/firms participated in the meeting through their representative personnel.

1. TEMA India Pvt. Ltd. (TEMA)

- I) Mr. Anil Bahl (In-person)
- II) Mr. Ashok Panchal (In-person)
- III) Mr. Abhijeet Nair (In-person)

2. Larsen & Toubro Limited (L&T), Precision Engineering and Systems (PES)

- I) Mr. Karthik Rajkumar Govindaraj (online)
- II) MR. Ramamurthy (online)
- III) Mr. Vijayanand (online)

3. Kyathi Climate Modification Consultants LLP (KCMC)

- I) Mr. Krishi Koliwad (online)

Agenda points for the discussion meeting:

- Turnkey nature of the Cloud Chamber project

- Design and engineering methodologies
- Scientific and technical support requirements
- Project execution strategy
- Subcontracting aspects
- Tentative timelines and budgetary estimates
- Milestone-based execution and deliverables
- Clarifications related to the proposed RFP process

Proceedings of the Meeting

At the outset, Dr. Shivsai Dixit highlighted that the proposed Cloud Chamber Research Facility is a developmental and first-of-its-kind scientific project in India in the domain of Cloud Physics research. It was emphasized that the project is envisaged as a turnkey project involving design, development, manufacturing, installation, commissioning, and scientific validation of the Cloud Chamber Research facility.

The committee acknowledged and agreed that the cloud chamber design forms the most critical component of the project and that concerned IITM scientists should be actively involved during the design reviews and technical discussions with the design team of the successful bidder to ensure fulfillment of the scientific objectives. At the same time, the committee stressed that although IITM team would be part of the technical interactions and scientific guidance as and when required, the overall responsibility of all the aspects of the project (design, development, manufacturing, installation, commissioning, and scientific validation) and its successful completion, entirely lies with the successful bidder.

Queries/Inputs from Participating Companies/Firms during the meeting

1. Larsen & Toubro Limited (L&T)

Sr No.	Queries / Clarifications Raised	Committee Response /Discussion
1	Extent of scientific support from IITM during design, development and validation.	IITM scientists shall provide scientific guidance, technical interactions, and participate in design reviews. Overall responsibility of all the aspects of the

		project and its successful completion, entirely lies with the successful bidder.
2	Clarification on scientific deliverables and acceptance criteria.	Acceptance criteria shall include establishment and maintenance of specified temperature and humidity conditions, convection, droplet formation, statistically stationary droplet-size distributions etc. over the specified periods typical of the planned experiments.
3	Whether a dedicated IITM scientist/project lead will support execution.	IITM scientists will engage in discussions and guidance through appropriate technical committees. There will be identified IITM scientists/staff for contact regarding different aspects of the project. However, bidders should onboard scientific experts capable of translating scientific requirements of the project into engineering solutions meant to achieve them.
4	Availability of an existing prototype facility.	No identical prototype facility exists. The project is developmental in nature. Relevant literature and similar facilities may be referred to for guidance. The development of a scaled and fully functional prototype and demonstration of its successful operation should be included in the RFP. Further, the numerical simulations required for assessing the expected performance of the cloud chamber shall also be included in the RFP.
5	Possibility of using IITM facilities during development.	Aspects such availability of electrical power for the execution of the project, storage of materials, labor stay and food arrangements, commutation of materials and labor in and out of the institute premises etc. will be elaborated upon in the RFP.
6	Request for one-to-one technical interaction meetings.	One-on-one technical interactions/meetings may be arranged prior to finalization of the RFP. Interested companies/firms may formally send a request email to IITM (psu.iitm@tropmet.res.in) for such discussions.

7	Feasibility of turnkey execution. L&T expressed confidence in executing the project subject to appropriate scientific support and technical consultations.	The committee noted this point. The committee further noted that the aspects of scientific support and technical consultations are covered in points 1 and 3 above.
8	Subcontracting strategy. L&T indicated that civil works, infrastructure, and specialized components may be executed through internal divisions and specialized subcontractors.	The committee noted this point regarding the subcontracting strategy.
9	Estimated project duration. L&T indicated that approximately 2-3 years may be required for execution, commissioning, and validation.	The committee noted this point regarding the project timeline.
10	Liquidated Damages (LD) applicability. L&T suggested that LD should apply only to unfinished or delayed deliverables and not to completed milestones.	The committee noted this point regarding the LD clause and suggested that the commercial committee may look into this aspect and include in the RFP as appropriate.
11	Milestone-based payment mechanism. L&T suggested to have milestone based payment approach which is standard practice for all developmental projects.	Committee noted this point regarding milestone-based execution and payment structures is a valid point given the developmental nature of the project. Technical milestones shall be looked into by this committee and the commercial aspects for the same may be looked into by the commercial committee. The finalized execution and payment structure should be included in the RFP.
12	Budgetary estimate. L&T mentioned that detailed budget estimates would require further	Committee noted this point.

	technical assessment.	
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2. Kyathi Climate Modification Consultants LLP (KCMC)

Sr. No.	Query / Observation	Committee Response / Discussion
1	Suitability of turnkey execution approach. KCMC indicated that the project needs to be carried out in a turnkey manner since it involves components from inter-dependent disciplines.	Committee noted this point and reiterated the benefits of maintaining a single point of responsibility for design, manufacturing, and performance realization of the entire project.
2	Clarity on temperature control requirements and heating specifications is required.	Committee noted that broad performance criteria shall be included in the RFP stage with as much clarity as possible and detailed technical specifications need to be worked out in the design phase of the project.
3	Need for additional technical consultations.	Committee noted that interested companies/firms may formally send a request email to IITM (psu.iitm@tropmet.res.in) for such discussions.

3. TEMA India Pvt. Ltd.

Sr. No.	Observation / Suggestion	Committee Response / Discussion
1	Strong project management and sound financial capability are required from the bidder's side.	Committee acknowledged this point considering the multi-disciplinary nature of this developmental project and noted that this aspect needs to be considered while preparing the RFP document.
2	Possible international technical collaboration with firms/companies holding specific expertise	Committee noted this point and agreed that onboarding of consultants, technical experts, companies, firms with demonstrated/vetted/proven special technical expertise useful for various aspects of the project may be required. However, onboarded firms should satisfy the geographical

		requirements laid out by the Govt. Of India.
3	Concerns regarding uncertainties during scientific validation.	Committee noted that bidders should onboard scientific experts capable of translating scientific requirements of the project into engineering solutions meant to achieve them. The scientific validation of the facility before acceptance shall be carried out with measurable and well-laid-out conditions. These will be elaborated upon in the RFP.
4	Concerns regarding blanket LD provisions.	The committee noted this point regarding the LD clause and suggested that the commercial committee may look into this aspect and include in the RFP as appropriate.
5	Project duration estimate. TEMA indicated that approximately two years may be required subject to successful validation and acceptance testing.	Committee noted this point regarding the timeline of the project.

Queries/Inputs from Participating Companies/Firms over email

1. Larsen & Toubro Limited (L&T)

Sr No	L&T Request for clarifications	Committee Response / Discussion
1	Will Fluid Dynamics Laboratory (FDL) at IITM, Pune support in arriving technical and scientific aspects of the project. As they have good understanding in turbulent flows and cloud	Yes. IITM scientists will engage in discussions and guidance through appropriate technical committees. There will be identified IITM scientists/staff for contact regarding different aspects of the project. However, bidders should onboard scientific experts capable of translating scientific requirements of the project into engineering solutions meant to achieve them. And the

	related research, their support will help fast track the execution.	overall responsibility of all the aspects of the project and its successful completion entirely lies with the successful bidder.
2	The flow parameters, droplet size, rate of temp change, etc required in the cloud chamber	The RFP will include the finalized performance requirements related to temperature, humidity, and boundary conditions etc. Detailed flow characteristics, droplet distributions, and related performance parameters are expected to emerge according to the laws of physics and thermodynamics from the final chamber design proposed by the successful bidder in consultation with IITM.
3	Is it sufficient to meet only the specifications required for various subsystem like hot bath, cold bath, walls, etc. Or will the final parameters like droplet size, various non dimensional numbers, etc be the responsibility of vendor.	The engineering requirement is to meet the specified operating ranges and performance requirements of the hot bath, cold bath, sidewalls, control systems, and associated infrastructure. These will be clearly outlined in the RFP. The scientific performance objectives will also be set in the RFP and should be met for successful completion of the project. The scientific experts onboarded by the successful bidder shall be crucial to this aspect. Achieving the final specified performance (engineering + scientific) of the facility remains the responsibility of the successful bidder.
4	Is there any requirement for pressure control in the chamber? What will be approximate pressure in the chamber	The chamber is expected to operate close to atmospheric pressure. No dedicated pressure control system is presently envisaged.
5	Details of temperature sensor, humidity sensor, droplet size probe specifications. Number of these sensors required.	The final sensor (temperature, humidity etc.) specifications, quantities, and locations will be finalized during the detailed design stage based on the proposed chamber configuration and scientific requirements. Probes for measuring the droplet sizes shall not be in the scope of the present RFP since they are being procured separately. They shall be made available for measuring droplet size distributions during the final acceptance of

		the scientific objective. Specifications of an aerosol injection system i.e. a system of injecting aerosols with known number concentration, composition, and size, are planned to be included in the RFP.
6	For the two condition of side wall (adiabatic and temperature boundary condition) is it acceptable to have some removable setup at all walls.	As indicated in the EoI, the preferred approach is to switch between Sidewall Temperature Boundary Condition (STBC) and Adiabatic Sidewall Boundary Condition (ASBC) modes without physical removal or replacement of sidewall panels. RFP shall include more details of the performance requirements. Alternative solutions may be proposed and justified in the detailed design stage for evaluation by the technical committee.
7	Type of control system to be used and make	The bidder needs to propose the best-suitable industrial-grade feedback control system (PID or equivalent advanced control architecture) for effective control of the chamber parameters to achieve stable performance. The final make and configuration shall be subject to approval during a detailed design review.
8	What type of insulation can be used for radiation prevention. Will any specification be provided	The selection of insulation materials and thermal management strategy shall be the responsibility of the bidder. The proposed solution should meet the temperature-control, safety, durability, and energy-efficiency requirements of the facility.
9	How can thermal uniformity be maintained across the condensed surface.	The bidder's methodology for achieving the specified temperature uniformity over the side-wall surfaces shall be proposed as part of the detailed design. IITM technical team will evaluate the proposed approach during the detailed design review.
10	What duration of backup power is required	The UPS backup is required for scientific instruments and servers. Detailed backup and duration requirements and load categorization will be finalized during the RFP stage and detailed engineering phase.
11	Electrical and fire safety compliance standards. Any regulatory compliance to be	The facility shall comply with all applicable Indian electrical, fire, structural and safety regulations, including statutory approvals, certifications and

	met	clearances required for construction, installation and operation.
12	Any testing or validation test and requirement of separate test setup for the same	Factory Acceptance Tests, performance validation, and commissioning protocols shall be finalized during the RFP and detailed design stages. There is also a scaled, working prototype to be manufactured by the successful bidder that will serve as a guideline for the final design of the main cloud chamber. These details will be included in the RFP. The bidder should propose an appropriate testing and validation methodology from their end as well in consultation with the scientific experts onboarded for this project.
13	What will be maintenance, warranty and support clauses requirement	Detailed warranty, operation, maintenance, and post-warranty support requirements will be specified in the RFP. Bidders are encouraged to provide recommendations and support plans in their proposals.
14	Will the IP be in combined ownership between L&T and IITM	IITM shall hold the full and complete Intellectual Property Rights (IPR) for the entire project and all of its components including the design of the Cloud chamber, its prototype etc.

2. Kyathi Climate Modification Consultants LLP (KCMC)

No email was received from KCMC.

3. TEMA India Pvt. Ltd.

No email was received from TEMA.

Recommendations:

1. The project should continue to be pursued as a turnkey developmental project.
2. Participating firms should onboard scientific/technical experts or consultants to ensure meeting of the scientific goals from the engineering design of the cloud chamber.
3. IITM may conduct one-to-one technical interaction meetings with interested firms in case any such requests are received.
4. Non-commercial technical clarifications may be shared commonly with all prospective participants.

5. Milestone-based execution and payment structures to be considered during preparation of the RFP document.
6. A project timeline of 2 to 3 years appears to be modest based on the inputs from the participating firms.
7. The complete responsibility of the successful execution and delivery of the project including all the engineering and scientific deliverables as per the RFP, lies with the successful bidder.

The committee extended thanks to all the participating firms for their valuable inputs and observations. The suggestions discussed during the meeting and as summarized above shall be considered during preparation of the RFP document. These minutes may be put up for approval of the competent authority and may subsequently be uploaded to the website.