# TERMS OF REFERENCE FOR THE R&D PROJECTS

**1. Title of the Project**: Impurities in domestic supply of compressed biogas blended PNG in India and their effects on metrological performance of gas meters.

**2. Background:**

**2.1** Weights and Measures Sectional Committee, PGD 26 under the Production and General Engineering Division Council is working on development of a new Indian Standard for Thermal Mass Flow Gas Meters. The Preliminary draft standard has been circulated for comments. For incorporation of the test for effect of impurities on meters, the outcome of this study will be important.

**2.2** The EN 17526 is a European standard on thermal mass flow meters which has a test (see clause 5.7 of EN 17526 : 2021) for accessing the effect of impurities in gas supply on the metrological properties of a thermal mass flow gas meters. Since the EN standard tests only for ferrous impurities which may not be prevalent in Indian pipelines, there is a need to determine the impurities which are currently found in the gas pipelines in India and their effect on metrological performance of the thermal mass flow meters.

**2.3** Currently in India, the domestically used Piped Natural Gas (PNG) is primarily sourced from R-LNG, Bombay High LNG, or Compressed Biogas. Three distinct research and development (R&D) projects have been initiated based on the diverse sources of gas.

**3. Objective**:

**3.1** Identification of various impurities including moisture content and particulate matter in compressed biogas blended PNG supplied in domestic households at the consumer end in India.

**3.2** Study of effect of these impurities on metrological performance of Thermal Mass Flow Gas Meters, Ultrasonic Meters and Diaphragm Gas Meters all in G 1.6 capacity or the lowest available capacity in the Indian Market for Domestic Purpose.

**4. Scope**:

**4.1** Extensive literature review for method of tests of effects for identification of impurities in gases and the effect of impurities on metrological performance of gas meters. The literature review may include International Standards such as ASTM, JIS, EN, ISO etc available on the subject, research papers, any study conducted by other organisations, companies' brochure etc.

**4.2** Conducting a comprehensive analysis to identify key gas suppliers, locating manufacturing bases specializing in various types of gas flow meters, and pinpointing testing facilities dedicated to gases and flow meters within India.

**4.4** Following the data acquisition on suppliers and manufacturing bases, presenting proposed Sampling Plans (SP1 and SP2) for approval from the Bureau of Indian Standards (BIS). Implementing a systematic approach for the collection of gas samples according to Sampling Plan (SP1). Concurrently, gathering samples of gas meters from leading manufacturers across various types, adhering to Sampling Plan (SP2).

**4.5** Testing of gases for impurities and testing of gas meters for metrological performance as per identified test methods. Comparison of performance of different types of gas meters.

**4.6** Prepare a comprehensive project report incorporating the points mentioned above.

## 5. Research Methodology:

**5.1** Study the literature and analyse the findings.

**5.2** With the help of a structured questionnaire, collection of feedback. Interview with the major manufacturers of gas meters, gas suppliers and laboratories as applicable.

**5.3** Preparation of sampling plan, collection of meters and gas samples as per the approved sampling plan, testing of the products as per identified test methods.

**5.4** On-site visits to gas meter manufacturing units and laboratories:

a) Two manufacturers of gas meters preferably one large and one msme should be visited.

b) Two laboratories, preferably one in government sector and one in private sector should be visited.

**5.5** Focus group discussions with industry experts and stakeholders to gather valuable insights and feedback.

## 6. Requirement for the CVs:

The project will engage experts with qualifications and experience in Mechanical engineering, Industrial Metrology, Standardization or any other relevant field. CVs of the personnel involved in the project will be required to assess their expertise.

## 7. Expected Deliverables:

**7.1** Analytical report on various impurities including moisture content and particulate matter found in compressed biogas blended PNG supplied in domestic households at the consumer end in India.

**7.2** Report on study of effect of the above identified impurities on metrological performance of Thermal Mass Flow Gas Meters, Ultrasonic Meters and Diaphragm Gas Meters all in G

1.6 capacity or the lowest available capacity in the Indian Market for Domestic Purpose with comparison.

**7.3** Along with the report the following has to be appended to the report:

i. Summary of literature review
ii. Summary of the interview
iii. Outcome of the market survey
iv. Comparison matrix of the various tests.

## 8. Timeline and Method of Progress Review:

The duration of the project is 6 months from the date of award of the project. The proposed indicative timeline stage-wise is given below:

| S No | Stage | Time from date of award of project (cumulative) |
|---|---|---|
| 1 | Literature review and identification of manufacturing base, testing laboratories, user/user industry, and discussion with BIS for the finalization of sampling plan | 1 month |
| 2 | Visit to manufacturers, testing laboratories, users and importers and exporters and data collection | 2 months |
| 3 | Initial report on impurities found in gas sample | 3 months |
| 4 | Testing and Comparison of Meters | 4 months |
| 5 | Preparation and submission of first draft report to BIS | 5 months |
| 6 | Submission of final project report | 6 months |

Note : The proposer may submit the draft report to BIS without waiting for test report from independent laboratories if the test is of long duration.

## 9. Support BIS will Provide:

National /International standards relevant to the project.

## 10. Nodal Person

Shri Kundan Giri, Sc-C & Member Secretary, PGD 26, Email: pgd26@bis.gov.in