Terms of Reference for Research Project

TITLE: Comprehensive study of the principles, processes, and procedures to conduct a water audit in water utility to evaluate water use efficiency.

1. BACKGROUND

1.1 Goal 4 of the National Water Mission states to increase the water use efficiency of the country by 20% which is currently at 60% for urban water utility. Water audit plays a crucial role to identify and take measures to control the water losses in the water supply systems. Currently, there is no Indian/International standard available and in the absence of which, the majority of the stakeholders are following their standard operating procedures(SOPs)/guidelines which is leading to inconsistency, inaccuracy in water audit data collection, lack of accountability, challenges in regulatory compliance, reduced public confidence and increased water stress.

1.2 To ensure uniformity, accuracy and consistency in the process of water audit, the Drinking Water Supply, Wastewater and Stormwater Systems and Services Sectional Committee SSD 14 has decided to develop an Indian Standard on Water Audit and Water Use Efficiency.

1.3 In order to take a holistic view of the subject, it is important to conduct a detailed study of primary as well as secondary data and information on principles, processes and procedures for conducting water audits in different top-tier water utilities in the country.

1.4 The project aims to prepare an analytical report that will serve as the basis for standard formulation on water audits in water utility services.

2. OBJECTIVE

The primary objective of the project is to collect information, data, and evidence from primary and secondary sources on principles, procedures and guidelines to prepare a framework for conducting water audits in water utilities to evaluate water use efficiency.

3. SCOPE

3.1 Undertake the review of existing literature including related standards, regulations, reference materials, case studies and SOPs in the context of water audit in water utility for the estimation of its water use efficiency.

3.2 Comparative analysis of information and data collected as per **3.1**.

3.3 Based on the analysis of information and data as per **3.2**, conduct a study on the principles, procedures and guidelines to develop a framework for conducting water audits in water utilities including the following:

a) Water balance (including source evaluation, calculation of authorized consumption, evaluation of apparent and real losses, and other components of water balance);
b) Metering processes;
c) Maintenance practice of assets;
d) Key performance indicators (KPIs) for evaluating water use efficiency in water utilities;
e) Resources (such as equipment, personnel, infrastructure) require to conduct water audit;
f) Training and competency of personnel;

g) Identification of areas of improvement in water utility services to increase water use efficiency;
h) Criteria for the selection of water auditors including qualification, experience, or any other skill required; and
i) Documentation required in the process of water audit.

3.4 Conduct visits as per clause **4** (d).

4. METHODOLOGY

The research project will follow a structured methodology that includes, but not limited to, the following:

a) Prepare a preliminary report and structured questionnaires in consultation with BIS/TC through the review conducted as per **3.1** and submit the report to BIS/TC.
b) Collection of feedback through the circulation of structured questionnaires (to be finalized in consultation with BIS) to obtain relevant information/data from at least **fifty** experts in context with **3.3**.
c) Conduct interviews with at least **five** experts/auditors and have focus point discussions on important aspects as mentioned under para **3.3**.
d) Conduct visits to five water utilities (One each from Mega Cities, Metro Cities, Town and Rural sector) located in different regions of the country and collect information/data as covered under **3.3** above. After identification of water utilities to be visited, take prior consent of BIS before proceeding further.
e) Conduct focused discussions with experts of the identified water utilities for comparative analysis of the information/data collected.
f) Prepare a study report based on findings and data collected as covered in scope (para **3**).

5. DELIVERABLES

5.1 An analytical report containing information and data as mentioned in Scope (para **3)** along with appended evidence containing statements, questionnaire, details of interviews, outcome of consultation with experts and data collected during literature review and visits.

5.2 Hard as well as soft copy of the report shall be submitted within the timeframe as mentioned at para 6.

6. TIMELINE AND METHOD OF PROGRESS REVIEW

6.1 The time frame for completing the study and submitting the report is **6** months from the date of the award of the project.

6.2 Stage wise timelines are given below:

Stage	**Time from date of award of research project**	**Progress of work**
Stage 1	Within 45 days	Completion of review of literature and preparation of sampling plan & structured questionnaire.

Stage 2	46-120 days	Completion of feedback, field visit, expert interviews, focus point discussion.
Stage 3	121-150 days	Submission of draft research report to BIS for evaluations and recommendations by TC.
Stage 4	151-180 days	Submission of final report.

6.3 In case of delay in submission of report at any stage, the justification shall be given awardee for consideration by the Sectional Committee.

7. BIS SUPPORT

BIS will provide access to the latest available editions of Indian standards and/or international standards relevant to the project, on request.

8. NODAL PERSON

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