

Protocol for Evaluation of Technology for Waste Management



**Central Pollution Control Board
Delhi
June 2021**

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PROTOCOL FOR EVALUATION OF TECHNOLOGY FOR WASTE MANAGEMENT

1.0 Background

It is important to achieve scientific management of wastes and to build projects for waste management that are viable financially and technologically. In this context, selection of technologies is an important factor prior to implementing waste management infrastructure for common waste processing facilities especially for urban local bodies, industry or other agencies. Care should be taken in adopting suitable processes considering capital costs, operational costs, complexity of technology, environmental considerations and feasibility of operations in local conditions.

Swachh Bharat initiatives have given impetus to waste management infrastructure in country for different categories of wastes namely solid & plastic waste, e-waste, biomedical waste, industrial hazardous waste, construction and demolition waste. It has been observed that although several global technologies are available for waste processing, agencies responsible for implementing waste management projects have to often deal with technology providers advocating their technologies (mostly imported), and some of them have actually fail to yield expected results owing to lack of adaptation to local conditions. So there is a need for standardization of such technologies to suit the Indian scenario.

In addition to above, various provisions of Waste Management Rules as delineated below, mandate evaluation of existing as well as new technologies for Waste Management:

Rule 10 (a), C & D WM Rules, 2016: CPCB shall prepare operational guidelines related to environmental management of construction and demolition waste management.

Rule 14 (e), SWM Rules : CPCB shall review the proposals of State Pollution Control Boards or Pollution Control Committees on use of any new technologies for processing, recycling and treatment of solid waste and prescribe performance standards, emission norms for the same within 6 months;

Rule 6 (d): SWM Rules: MoHUA shall promote research and development in solid waste management sector and disseminate information to States and local bodies

Rule 5, PWM Rules: The plastic waste management by the urban local bodies in their respective jurisdiction shall be as under: -

- a. Plastic waste, which can be recycled, shall be channelized to registered plastic waste recycler and recycling of plastic shall conform to the Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics, as amended from time to time;
- b. Local bodies shall encourage the use of plastic waste (preferably the plastic waste which cannot be further recycled) for road construction as per Indian Road Congress guidelines or energy recovery or waste to oil etc. The standards and pollution control norms specified by the prescribed authority for these technologies shall be complied with;
- c. Thermo set plastic waste shall be processed and disposed of as per the guidelines issued from time to time by the Central Pollution Control Board;

Rule 7(5), 7(6) and Schedule-III(4) of BMW Rules: Provision for development of standards for new technologies for biomedical waste management by the urban local bodies in their respective jurisdiction shall be as under:

- a. Any person including an occupier or operator of a common bio medical waste treatment facility, intending to use new technologies for treatment of bio medical waste other than those listed in Schedule I shall request the Central Government for laying down the standards or operating parameters.
- b. On receipt of a request referred to in sub-rule (5), the Central Government may determine the standards and operating parameters for new technology, which may be published in Gazette by the Central Government.
- c. CPCB shall lay down standards for new technologies for treatment and disposal of bio-medical waste (Rule 7) and prescribe specifications for treatment and disposal of bio-medical wastes (Rule 7).

In order to comply with these requirements “Standing Committee on Technology for Waste Management” has been constituted vide OM No. B-17011/7/UPC II/ WM /2021 dated May 21, 2021 (**Annexure I**) to guide development of indigenous technologies and innovative waste management practices.

This document delineates the standard procedure for evaluation of technologies so as to recommend those technologies which are suitable for management of different type of wastes in the country.

2.0 Submission of application to SPCB

The proponent shall submit an application to concerned SPCB/PCC in the prescribed format (**Annexure II**) with a request to forward it to CPCB after endorsing the details submitted in the application

The application shall be endorsed by the concerned State Board with technical views/feedback, if any, and forwarded to CPCB within 15 days of receipt of the complete application. State Board may also forward any further relevant information to the CPCB. The proposals for waste management, other than solid waste, may be directly submitted to CPCB, if required. **Evaluation of technology**

- a) Upon receipt of the application and endorsement of the same by SPCB, CPCB shall review the application and application complete in all respects shall be referred to the Standing Committee. Expert members shall be invited to the Committee as per requirement
- b) Complete applications shall be evaluated by the Committee considering following aspects;
 - i. Environmental soundness of the proposal
 - ii. Technical feasibility
 - iii. Technology Readiness Level (TRL)
 - iv. Input quality acceptable and assured output matrix
 - v. Practical issues with respect to operations
 - vi. Potential to cause health risks to waste handlers / operators
 - vii. Pollution potential of emissions/discharges;
 - viii. Adequacy of the proposed facility for control of pollution;
 - ix. Quantity of residue/waste generated; Residue Management
 - x. Quality of the product/s generated, its marketability and strategies adopted for marketing
 - xi. Proof of compliance / national or international certifications if any?

Scale particularly in terms of Technology Readiness Level (TRL) is required to understand the level of proposed technology. If these trials are for below TRL 7, then Committee can take a call whether to consider/support the application, which is not completely a matured technology.

The review shall be completed within thirty days of the receipt of the application from State Board

- c) If the proposal is found to be satisfactory, need for conducting trial run & monitoring shall be assessed and if required a protocol for the trial run & monitoring protocol shall be prepared by CPCB.
- d) A pilot scale plant shall be set up by the applicant, in case, such plant has not already been installed, for the purpose of conducting the trial. Protocol for trial study shall be prepared specifying the duration, quantity of waste to be processed / utilised, the parameters to be analyzed for air/water/wastes streams/air quality, product quality and to study of aspects mentioned in para (c). The results of trial studies shall be compared with available or notified standards

of similar processes, international standards as well as BAT standards if any available. Need for collecting recipient environment samples will be decided based on type of process. The protocol shall be prepared within 30 days of completion of the evaluation of the application by the Committee

- e) A formal letter in this regard attaching the aforesaid protocol shall be issued by CPCB to the project proponent for conducting the said trial run with copy to SPCB/PCC, concerned department of the State and CPCB Regional Directorate of CPCB.
- f) It shall be responsibility of the proponent to take all safeguards while handling, transportation, storage, utilization etc. of the waste so as to avoid accidents, environmental damages etc. In the event of such accidents/damages, the proponent shall have sole responsibility and liability of the same.

The proponent shall engage an NABL accredited laboratory for carrying out the monitoring/ analysis during trial run as per the protocol prepared by CPCB. Cost of analysis shall be borne by proponent; however, the laboratory shall submit results directly to CPCB & SPCB for evaluation.

- g) The proponent, upon completion of necessary preparation for conduction of trial, shall communicate the same to CPCB, which in turn shall communicate it to the concerned Regional Directorate of CPCB and SPCB/PCC
- h) Regional Directorate, CPCB shall complete trial run jointly with the concerned SPCB/ PCC and submit the report to CPCB within one month of receipt of letter from Head office , CPCB as per the protocol prepared for the purpose.
- i) Trial run monitoring shall be carried out by the laboratory in presence of the CPCB & SPCB/PCC officials. CPCB / SPCB teams shall also collect samples cross checking or comparing with analysis of NABL labs. Depending on suitability, CPCB/SPCBs may conduct entire trial runs on its own.
- j) Upon satisfactory verification during trial run, detailed evaluation of the technology shall be carried out by the Committee as per the protocol
- k) Recommendation of the committee shall be based on scoring as per the criteria given at **Annexure III**. Approval of competent authority, CPCB would be necessary for the decision on consideration of the proposal. The evaluation shall be completed within one month of receipt of the trial run report
- l) Based on the outcome of the studies, CPCB may develop Standard Operating Procedures (SOPs) and checklist for utilization of wastes(PW/SW/BMW/other non-hazardous urban wastes).The conditions specified in the SOPs shall be part of permission/consent issued by SPCB/PCC. The Guidelines shall be developed within one month of the recommendation of the Committee

- m) CPCB shall prescribe performance standards and emission norms for the proposed technologies as per requirement.



केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय भारत सरकार
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE GOVT. OF INDIA

CENTRAL POLLUTION CONTROL BOARD

No. B-17011/7/UPC II/ WM /2021

May 21, 2021,

OFFICE MEMORANDUM

Sub: Standing Committee on Technology for Waste Management

It is important to achieve scientific management of wastes and to build projects for waste management that are viable financially and technologically. In this context, selection of technologies is an important factor prior to implementing waste management infrastructure or common waste processing facilities especially for urban local bodies, industry or other agencies. Care should be taken in adopting suitable process considering capital costs, operational costs, complexity of technology, environmental considerations and feasibility of operations in local conditions.

Swachh Bharat initiatives has given impetus to waste management infrastructure in country for different waste streams namely solid & plastic waste, e-waste, biomedical waste, industrial hazardous waste, construction and demolition waste. It has been observed that several global technologies are available for waste processing. Agencies responsible for implementing waste management projects are often encountered by technology providers advocating their technologies, and some of them have actually failed to yield expected results owing to local conditions.

In this context, Standing Committee has been constituted comprising of the following members:


- | | |
|--|------------------|
| 1. Member Secretary, CPCB | :Chairman |
| 2. Representative of Department of Science & Technology | :Member |
| 3. Representative of CSIR- NEERI | :Member |
| 4. Representative of Technology Information Forecasting & Assessment Council (TIFAC) | :Member |
| 5. Representative of Maharashtra SPCB | :Member |
| 6. Representative of Tamil Nadu SPCB | :Member |
| 7. Subject Specific experts from Academia, Research Institutes | |
| 8. DH, UPC II, CPCB | :Member Convenor |

Scope of Work of the Committee

1. To encourage and guide development of indigenous technologies and innovative waste management practices.
2. To suggest protocol for assessment, evaluation, field demonstration and validation of technology
3. To review techno-economic feasibility , environmental soundness and suitability in local climatic conditions and operating conditions of the technology
4. To suggest/ recommend technologies suitable for management of different type of wastes in the country and proposed to be adopted by agencies including common waste management facilities
5. To recommend on various aspects of technologies for waste management, such as storage, treatment, processing, recycle , reuse , disposal , use of IT based tools ,etc. in management of solid & plastic waste, e-waste, biomedical waste, industrial; hazardous waste, construction and demolition wastes
6. To address any other matter as referred to the Committee

Terms of Reference

1. The Standing Committee will be of permanent and continuous nature
2. CPCB shall be the nodal agency to coordinate activities of Committee
3. CPCB and DST will be permanent members
4. Nominee of TIFAC, NEERS will have tenure of three years
5. Area experts will be invited for specific tasks
6. Standing Committee shall meet on quarterly basis
7. The Committee can co-opt members from any technical organizations/institutes/departments/individual experts/industry
8. Expenses of the Standing Committee will be from the budget of CPCB
9. TA/DA and Expert fee to ex-official members shall be paid as per Rules.


(Prashant Gargava)
Member Secretary

Annexure II

Form for submission of application to SPCB or PCC

S.No	Details of Information required	Information provided
Part A	Contact Details	
1.	Name & Address of the contact person or the firm	
2.	Phone number with Email Id of contact person:	
Part B	Technology details	
3.	<p>Proposed technology description</p> <ul style="list-style-type: none"> i. Exact working principle and its operation process process flow diagram showing input raw material, process conditions, chemical reactions product outputs and waste streams along with essential characteristics ii. Technology package , if developed iii. Whether the proposed technology is developed or transferred iv. Technology readiness level (Annexure IV) v. Any agency involved during initial stages of proof of concept, scale up & validation <ul style="list-style-type: none"> i. Have any laboratory scale / pilot scale/ field studies been completed for the proposed technology?(if yes, details may be provided) ii. If any institute was involved during the feasibility study (if yes, please provide details) iii. If yes, please provide details of plant size, where studied, research papers published/ and patents filed if any, results of environmental parameters iv. Has any funding been received for technology development. If yes, please provide details vi. If any third part evaluation of technology done before (if yes, details to be provided) vii. Is there any patent ownership of the technology (if yes- provide details) viii. Scalability of technology ix. Buffer zone requirement(if any) x. Emergency planning 	Brief description or attach document
4.	<ul style="list-style-type: none"> i. Has the technology been implemented in India or abroad? ii. If yes, please provide details (location where it has been implemented, findings of the project implemented, international practices, emission standards (if any), risk factors, customization requirement for Indian conditions, , plant capacity, regulatory compliance, with local standards etc.) 	
5.	Advantages of technologies over existing technologies (e.g.	

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S.No	Details of Information required	Information provided
	suitability for remote/rural areas, suitable for unsegregated waste, hazardous waste etc.)	
6.	Pilot Plant - Already set up or is to be set-up If needs to be set-up; i. Details of proposed pilot plant: ii. Location, land requirement, capacity, type of raw materials to be used (matrix of characteristics with range), and time needed for setting up iii. Procedure for sourcing, transport and pre-treatment (if any) of waste iv. Details of additional permissions required for conducting pilot project (e.g. Consent from SPCB , Permission from DISH- Directorate of Industrial Safety and Health)	
7.	Estimated cost of implementation vis-à-vis size of operation	
Part C	Details of Raw material, Products & Byproducts	
8.	Details of waste proposed to be used as Raw material (Type, characteristics, quantity required for conducting assessment study)	
9.	Details of waste pre-treatment requirements (Matrix of characteristics with range)	
10.	Details of Products & byproducts formed(Type & Quantity)	
11.	Proposed mode of utilization of products	
12.	Mass balance of waste, by-product /residue	
Part D:	Pollution Control Aspects	
13.	Waste streams (Quantification & Characterization) including air emission, waste water and solid waste generated in the proposed technology	
14.	Proposed Pollution control measures for the waste streams including mode of disposal of residues	
Part E:	Miscellaneous Requirements	
15.	Area / land requirement for unit size of operation	
16.	Required resources such as water (m3/day), electricity (kW and kWh per day), other chemicals required for process etc.	
17.	Manpower requirement for proposed plant (pl specify unit capacity) a. Skilled b. Semi-Skilled c. Unskilled	
18.	Preferred/ suitable location for installation of technology (Rural/ Remote/Urban area)	

Annexure III

Evaluation of technology

Sl.No	Item	Score
1	Technologically feasibility (0-30) (Availability of Technology, Process & Pollution Control machinery, Requirement of infrastructure facilities, trained manpower, Operation & maintenance, utility of products etc.)	
2	Cleaner Technology (0-20) (Low resource requirement (raw material, water , electricity etc) ,	
3	Environmental impact (0-30) (Potential of Air, Water and Soil pollution, waste streams treatment/ disposal etc)	
4	Social Benefits (0 – 20) (Employment , Deployment in Rural /remote areas etc)	
	Overall Rating of Technology	
	Recommended (Yes / no) (Recommended if overall score> 70)	

TECHNOLOGY READINESS LEVEL (TRL)

RESEARCH DEVELOPMENT DEPLOYMENT	9	ACTUAL SYSTEM PROVEN IN OPERATIONAL ENVIRONMENT
	8	SYSTEM COMPLETE AND QUALIFIED
	7	SYSTEM PROTOTYPE DEMONSTRATION IN OPERATIONAL ENVIRONMENT
	6	TECHNOLOGY DEMONSTRATED IN RELEVANT ENVIRONMENT
	5	TECHNOLOGY VALIDATED IN RELEVANT ENVIRONMENT
	4	TECHNOLOGY VALIDATED IN LAB
	3	EXPERIMENTAL PROOF OF CONCEPT
	2	TECHNOLOGY CONCEPT FORMULATED
	1	BASIC PRINCIPLES OBSERVED