**NGT Matter**
**Time Bound**

F. No. CO-11/7/2023-AS-HO-CPCB-HO **Date:06/08/2025**

# NOTICE

**Subject: Inviting Comments/Suggestions on the Draft Report on Environmental Damage Cost Assessment (EDCA)- reg**

In compliance with the Hon'ble NGT order dated 02.12.2021 in the matter O.A. No. 175/2018 titled "Jammula Choudharaiah & Anr. vs. UOI & Ors.", a draft report on Environmental Damage Cost Assessment (EDCA) outlining methodologies for the assessment of environmental damage under various scenarios has been prepared.

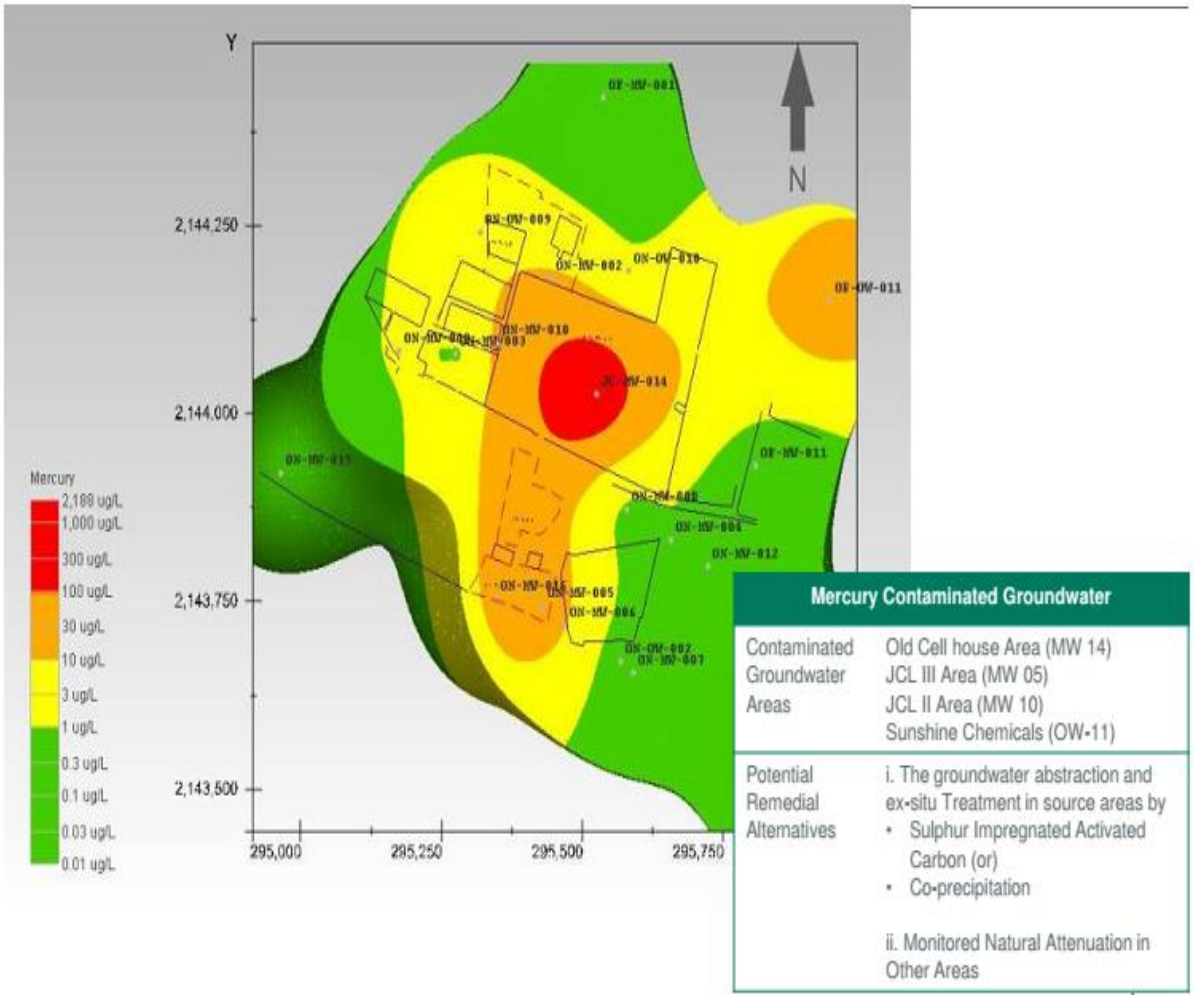
Stakeholders/Public are requested to send their comments/suggestion by **17/08/2025** on the following e-mail address: **anilranveer.cpcb@gov.in** and **ramandeep.cpcb@gov.in**

**(Anil C. Ranveer)**
Scientist 'E' &
Divisional Head (R&D)

**Draft Report**

# ENVIRONMENTAL DAMAGES COST ASSESSMENT (EDCA)

*(Report of Environmental Damage Assessment Committee of Ministry of Environment, Forest & Climate Change Constituted in Compliance to Hon'ble NGT Order dated 02.12.2021 in the matter of O.A No. 175 of 2018 titled as Jammula Choudharaiah & Anr. Vs UOI & Ors.)*




**July 2025**

## Background

Hon'ble National Green Tribunal (NGT) (Principal Bench) passed an Order dated 02.12.2021 in the matter of **O.A No. 175 of 2018** titled as Jammula Choudharaiah & Anr. Vs UOI & Ors.; entrusting the Ministry of Environment, Forest and Climate Change (MoEF&CC) to constitute a specialised Committee to determine appropriate methodology for assessment of Environmental Compensation for loss/damage/degradation to the environment, considering all relevant aspects of the matter. The said methodology shall be given statutory status by taking appropriate action by MoEF&CC so that the element of subjectivity in the matter of determination of Environmental Compensation may be eliminated or at least negated and a uniform approach is observed by Statutory Regulators in discharge of their statutory duties. Accordingly, in compliance with the Hon'ble NGT Order dated 01.12.2021, a committee was constituted by MoEF&CC on Environmental Damage Cost Assessment vide Order dated 22.11.2022. The constitution and Terms of Reference of the Committee are at **Appendix I.** Order for nominated members from NEERI and CPCB was issued vide Order dated 01.12.2022 (**Appendix II**). Subsequently, due to unforeseen demise of Sh K. Gowrappan, Former Chairman of the committee; Dr Satish R Wate, Ex-Director NEERI was appointed as the new chairman of the EDCA committee vide order dated 11.03.2024 (**Appendix III**). Considering the intricate nature of the subject and to address unavoidable delays associated with some unanticipated eventualities, the tenure of the Committee had to be extended in between. Twelve (12) meetings of the Committee were held during this period of time and on the basis of the detailed deliberations the extant '**Draft Report on Environment Damage Cost Assessment'** has been formulated.

***Disclaimer:***

1. ***The report is limited to calculation of environmental damage cost and does not address the relief or compensation under section 15 read with section 17 of the National Green Tribunal Act, 2010 (19 of 2010).***
2. ***The EDCA report shall be applicable on the sceneraios mentioned in the Schedule 1 and Schedule II***
3. ***Environmental Damage Costs is applicable to activities permissible under the relevant environmental laws.***
4. ***Activities that are not permissible under the relevant environmental laws shall not be covered under this report. Such activities shall be subject to stricter punitive actions under the applicable laws.***
5. ***The Environmental Damage Cost imposed under this report shall be in addition to any other penalties or compensations under laws such as public liablity insurance act, etc.***

**REPORT OF ENVIRONMENTAL DAMAGE ASSESSMENT COMMITTEE**

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## ACRONYMS

AC-Assessment Cost
CPCB - Central Pollution Control Board
CRZ - Coastal Regulation Zone
CTE - Consent to Establish
CTO - Consent to Operate
DC - Damage Cost
ECC - Environmental Compensation Charge
EDC- Environmental Damage Cost
EDCA - Environmental Damage Cost Assessment
EIA - Environmental Impact Assessment
FPC - Fixed Penalty Cost
GHG - Greenhouse Gases
IA-C&MD - Impact Assessment - Compliance and Monitoring Division
LCA - Life Cycle Assessment
LF - Location Factor
MoEF&CC - Ministry of Environment, Forest and Climate Change
NEERI - National Environmental Engineering Research Institute
NGT - National Green Tribunal
OA - Original Application
OCEMS - Online Continuous Emission/Effluent Monitoring System
PI - Pollution Index
PPP - Purchasing Power Parity
R - Rupee Factor
RC- Remediation Cost
TEEB - The Economics of Ecosystems & Biodiversity
ZLD - Zero Liquid Discharge

## Definition Of The Terms

**Environment**- Environment includes water, air and land and the inter- relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

**EDC**- Cost to be incurred by an industry/project for intended/unintended non-compliance of environmental conditions and / or environmental violations. This is to encompass damage cost which is calculated based on either on-ground analysis or mathematical modeling, penalty cost, and damage assessment cost. In case of major damage to the environment, restoration cost may also be required to be levied on case to case basis, if applicable on the basis of case specific study and the associated plan.

**EDCA**- The methodology evolved for assessing Environmental Damage Cost, which can be used by government and other stakeholders under various environmental regulations to calculate the costs of environmental damages for payment by defaulting industry/companies.

**DC-** For the purpose of providing immediate relief, damages to the abiotic and biotic components of the environment and human health are considered for Damage Cost (DC) calculation. Damage Cost are to be assessed based on either on-ground analysis or interpreted using available methodology. Estimates incorporate externalities caused by pollutants using the Value Transfer Method (VTM) and Avoidance Cost Method (ACM). Per Kg cost of the respective emissions/ damages using Meta-Analysis has been worked out and the costs are calculated using 2022 as the base year here.

**Damage Cost I (DC-I)**- Visible, Measurable, and quantifiable damage to the environment wherein on ground assessment of the damage is feasible and the Damage Cost is calculated using a combination of methodology which inter-alia include the Value Transfer Method (VTM), Abatement Cost Method, and Avoidance Cost Method (ACM). The methodology for calculation of DC I is adopted based on the suitability to the damage scenario. Various DC I scenarios and methodology for its calculation is at **Schedule-I**.

**Damage Cost II (DC-II)-** Indirect damage to the environment that is neither visible nor measurable and thus direct on ground assessment of the damage is not feasible. However, the damage is quantifiable and the Damage Cost is calculated using a combination of the existing methodology which *inter-alia* include Value Transfer Method (VTM), and Avoidance Cost Method (ACM). Various DC II scenarios and methodology for its calculation is at **Schedule-II**.

**Fixed Penalty Cost (FPC)-** Fixed Penalty Cost is the cost imposed as fine/penalty on any person/ company/ government department for contravention or non-complying with any of the provisions of Air (PCP) Act 1981, Water (PCP) Act 1974, and Environmental (P) Act 1986 (as amended time to time) or the rules made or orders or directions issued thereunder for which no penalty is prescribed, that has caused or has the potential to cause environmental damage directly or indirectly.

**Assessment Cost (AC)-** Cost for assessment of the damages and restoration (if applicable). The assessment cost can vary depending on the complexity of the assessment, the size of the affected area, and the type of damage that has occurred.

**Non-Compliance**: It means non-compliance of terms and conditions prescribed by the Regulatory Authority in the Environment Clearance (EC) or other environmental approvals accorded to the project.

**Violation**: It means cases where projects have either started the construction or installation or excavation, whichever is earlier, on-site or have expanded the production capacity and /or project area beyond the limit specified in the environmental clearance (EC) without obtaining EC or change of scope without prior approval from the Ministry.

**Vulnerability:** Vulnerability is the degree to which natural, built, and human systems are at risk of exposure to environmental impacts and hazards. It is shaped by physical, social, economic, and environmental factors that increase the susceptibility of individuals, communities, and assets to harm. Vulnerability includes both inherent factors, such as age and race, etc. and acquired factors, such as health behaviours, socioeconomic status, access to healthcare, housing conditions, lifestyle choices, social networks, and cultural practices, etc. To enhance clarity and facilitate assessment, vulnerability can be further bifurcated into:

1) **Vulnerable Population:** Vulnerable populations are groups and communities at a higher risk of adverse physical, psychological, or social health outcomes. These risks are further intensified by social, economic, political, and environmental factors. The environmentally vulnerable population *inter alia* include:
    (i) **Minority groups-** Racial or ethnic minorities, sexual or gender minorities.
    (ii) **Economically disadvantaged groups-** Homeless population, Low income population.
    (iii) **Chronically ill or people with disabilities-** Populations living with HIV/AIDS, population living with chronic mental health disorders, substance users.
    (iv) **The elderly, children and mothers**
    (v) **Rural residents**

2) **Vulnerable Ecosystem:** Vulnerable Ecosystem is defined as the ecosystem which makes a community or area more susceptible to damage due to increased risk of exposure to environmental hazards. This vulnerability arises from factors such as the likelihood of disruption or damage to environment, communities, structures, services, or geographic areas based on their conservation status and proximity to hazardous terrain, disaster-prone regions, and the nature of their construction. The vulnerable ecosystem *inter alia* includes.

   Biosphere reserves, mangroves, wetlands, Eco-sensitive zones, Coastal Regulation Zone, forest land, protected areas under the Wildlife (Protection) Act 1972, wildlife corridors, reserved forest area, biodiversity hotspots (the Himalayas, the Indo-Burma region, the Western Ghats, and the Sundaland (Andaman and Nicobar Islands), Indo-Gangetic Plains, river basins, coral reefs, grasslands, marine ecosystem, cold dessert ecosystem.

**Remediation Cost (RC)**- The cost of long-term measures for remediation/restoration of the environment to bring to its condition prior to an incident/accident which caused major damage to its environment.

Remediation Cost is to be over and above the damage cost imposed and is to be levied subsequently on the project on the basis of a detailed study and approved plan, in case of grave injury to the environment and health. In all these cases, detailed investigations are required from expert institutions/organizations, which are to be enlisted by CPCB. In such cases comprehensive plan for the remediation of environmental pollution may be prepared and executed under the supervision of a committee with representatives of SPCB, CPCB, and expert institutions/organizations.

RC to be levied over and above the damage cost imposed on the project. The damage cost will be imposed on PP at first and then remediation cost will be imposed subsequently on a case-to-case basis. This cost will depend on the site conditions and shall be estimated accordingly, which might be even greater than the damage. This shall follow the detailed prescribed procedure of CPCB and the DPR provided by the consultant. Bank Guarantee from PP can be provided for the RC.

**Abatement Cost Method**: This method calculates the cost required to reduce one unit of a specific pollutant through various interventions, providing an economic measure of pollution control.

**Avoidance Cost method:** Cost based method, relates to the costs that would have been incurred in the absence of prescribed mitigation measures.

**Shadow Pricing Method:** Shadow pricing refers to assigning a monetary value to something not regularly traded in the marketplace, estimating its worth through indirect means.

**Value Transfer Method**: This method involves transferring economic value estimates from studies conducted in one location to a different location to estimate the economic value of similar environmental goods or services in the new area.

# 1. Introduction

Environmental Damage Cost (EDC) is a monetary measure of the environmental or ecological impacts caused by an anthropogenic activity that releases pollutants beyond the acceptable norms or alters the natural ecosystem, which may have detrimental effects on the receptor population or the ecosystem.

Environmental economics focuses on two aspects: the environmental harm caused by released pollutants and natural resource depletion, and how it affects the value of their services. In addition, non-compliances and violations to environmental laws and regulations lead to environmental impacts, which can also be evaluated through various econometric methodologies. The environmental damage assessment thus considers the issues of pollution control, waste management and conservation of natural and ecological resources, and the effective development and implementation of environmental regulations that include identifying the responsible parties, attributing the liabilities, assessment of environmental damage, remediation of damages, restoration of ecological damages and its valuation, including the liabilities of the responsible party.

Environmental damage is an obligation on the responsible party to meet future costs due to the past or ongoing manufacture, use, extraction of material, release, or threatened release of a particular substance in excess of permitted levels or other activities that adversely affect the environment or human health.

Environmental Damages cost is required to be imposed retroactively with strict liability for assessment and remediation costs. The damages cost is applicable for the actual environmental damages or alleged releases of pollutants that makes the responsible party obligated to pay such cost towards remediation (clean-up) including the costs associated with restoration of ecological damages and may also refer to compensation for indirect damage to receptor population or ecosystem, including the potential for fines, penalties for violations of environmental laws.

The principle of strict liability shall be exercised on the responsible party while implementing environmental damage cost liabilities, irrespective of fault, negligence or intent. In cases where two or more persons are liable in respect of same damage, the principle of "joint and several liability" shall be imposed. Under joint and several damage liability, a claimant may pursue an obligation against any one party as if they were jointly liable and it becomes the responsibility of the defendants to sort out their respective proportions of damage cost and payment.

# 2. Brief Description of EDCA

These guidelines for EDCA primarily provide the environmental damage cost liability for the release of pollutants in excess of environmental standards, violation of waste management rules/guidelines, non-compliance to the conditions of environmental

clearance and other environmental approvals, assessment of impacts, restoration of environmental and ecological damages, and fixed penalty costs. However, it does not cover the costs associated with indirect liabilities and compensation/relief.

Fixed penalty costs are envisaged as immediate fine in all cases of violation and non-compliance of environmental conditions that has caused or has the potential to cause environmental damage directly or indirectly.

Damage costs take into account the cost of damages to the environment and may constitute the variety of scenarios, some of which may be quantifiable while in other cases the damages may be indirect and difficult to quantify. Depending on the type of scenarios, the Damage Cost is classified as Standard Damage Cost that can be estimated based on Environmental Externalities, Value Transfer Methods, Avoidance Cost Methods, etc. This is applied to scenarios such as quantum release of pollutants in excess of permissible limits, damage to ecology and biodiversity, improper management of wastes as per the waste management rules notified and amended under Environmental (P) Act, 1986, etc. However, where the Standard Damage Cost Assessment methods could not be applied, the Indirect Damage Cost assessment methods are provided based on pollution potential and quantum release of pollutants. The Indirect Damage Cost is calculated for violations by Industries/facilities, GW extraction, Solid waste management, Disaster management and risk assessments, Occupational Health and safety, and energy conservation related to building, infra, industries, and Mining, etc.

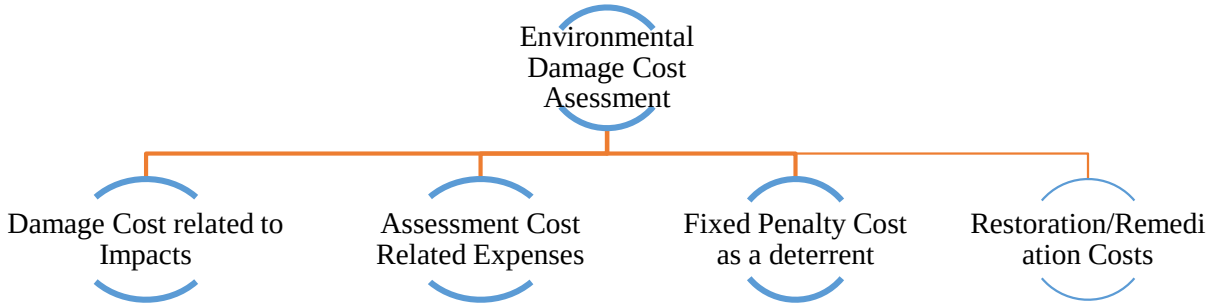


***Figure 1**: Structure for EDCA calculation*

## 3. Non-Compliance And Violation Cases For Applicability of EDCA

The following sample case scenarios for the assessment of EDCA are envisaged;

(i) Release of pollutants in excess of prescribed norms, which resulted in damage to the environment, both measurable and unmeasurable
(ii) Non-compliance to EC and other regulatory conditions having the potential to cause environmental impacts
(iii) Non-compliance to directions issued/ non-submission of data/data

manipulation

(iv) Accidental discharge lasting for a short duration, resulting in damage to the environment

(v) Intentional discharges resulting in acute injury or damage to the environment

(vi) Other activities that resulted in damage to the environment, ecosystems, and its functions.

## 4. Scenarios For Applicability of EDCA Formula

The above scenarios of non-compliances and violation cases are structured in four broader groups as below in order to calculate Environmental Damage Cost Assessment:

(i) Undertaking project/activity without EC or CRZ clearance and falling in the ambit of EC Violation or CRZ Violation

(ii) Non-compliance of environmental approval conditions with the feasibility of assessing damage on the ground.

(iii) Non-Compliances to Environmental approval conditions where on-ground damage cannot be assessed

(iv) Non-compliance to environmental approvals, which are only procedural in nature, does not cause any environmental damage such as non-submission of such documents other than regulatory approvals, eg. half-yearly compliance report, financial statements etc.

## 5. Equations For EDCA

### 5.1 Standard Environment Damage Cost (EDC)

EDC shall be determined based on an assessment of actual damage, quantifiable through on-site analysis and other damages which may not be quantifiable directly but can be computed through indirect assessments based on the available data with the industries and regulatory agencies. For this purpose, the concerned industries or institutions are required to maintain and furnish valid and verifiable data sets. Such data shall include, but not be limited to, records pertaining to the quantum and nature of pollutant discharges, duration of non-compliance or violation, and the corresponding pollution potential. The following Equation (1) shall be used to evaluate Environmental Damage Cost (EDC).

$$\mathbf{EDC=FPC+DC+AC} \quad \text{……. (Equation 1*)}$$

***Note-1:** The Assessment cost (AC) is not applicable if PP engages expert consultation for assessment.

***Note-2:** Remediation Cost (RC) will have to be imposed over and above EDC as proposed above wherever applicable.

***Note-3:** With respect to DC herein for violation cases, all the relevant applicable scenarios under DC-I and DC-II will be used.

Where **EDC** is the Environmental Damage Cost with components namely

**FPC** - Fixed Penalty Cost
**DC** - Damage Cost
**AC** - Assessment Cost on actual basis
**RC** – Remediation Cost

****Equation 1*** *is the standard equation and the parameters to be entered as per applicable scenarios.*

## 5.2 Scenario-Wise Formulas For EDC

**Case I: No prior EC/CRZ Clearance and other Environmental Consents/approvals (CTO/CTE/CCA) i.e., Violation Cases**

Cases where no prior clearance has been obtained and falls in the definition of violation shall refer to the following Equation.

**EDC=FPC+DC+AC**……. (Equation 1*)

**Case II: Non-Compliance with the conditions of EC and of other environmental approvals**

**(i) Case II(A):** Non-compliance of environmental approval conditions with the feasibility of assessing damage on the ground.

**EDC=FPC+DC I+AC**……. (Equation 2)

**DC I**- Damage Cost to be assessed based on ground analysis as enumerated above in the definition

**(ii) Case II(B):** Non-compliance of environmental approval conditions where on-ground damage cannot be assessed

**EDC=FPC+DC II+AC**……. (Equation 3)

**DC II** - Damage Cost to be interpreted using available methodology as enumerated above in the definition

**(iii) Case II(C):** Non-compliance to environmental approvals, which are only procedural in nature, does not cause any environmental damage, and

does not fall under Case II(A) and Case II(B) above will attract only **FPC**. For example, Non-existance of wildlife conservation plan, Disaster Management Plan, Environment Emergency Plan etc.

## 5.3 Damage Cost (DC)

### 5.3.1 Standard Damage Costs For Release Of Quantifiable Pollutants

Environmental externality is a negative outcome of anthropogenic or industrial activities, which affects third parties who are not directly involved in or responsible for the said activities. The work program of Millennium Ecosystem Assessment under United Nations, and The Economics of Ecosystem and Biodiversity (TEEB) has been referred for assessing financial values of environmental damages associated with the ecosystem. Accordingly, the following methods are considered for assessing standard damage costs:

1. **Market price method:** Products and benefits of an ecosystem are monetized based on the commercial market.
2. **Productivity method:** Calculate the ecosystem's financial worth based on the services it provides for traded items.
3. **Hedonic pricing method:** Quantify the economic value of service provided by an ecosystem based on its direct effect on other marketed goods.
4. **Travel cost method:** Estimates the economic value of an environment based on how much people spend visiting it.
5. **Damage cost avoided, Replacement cost and Substitute costs method:** The amount saved by preventing the loss, regeneration, or substitution of an ecosystem is used to calculate economic value.
6. **Contingent valuation method:** Economic value is determined by asking people directly about their willingness to spend or accept compensation for specific ecosystem services under hypothetical circumstances.
7. **Contingent choice method:** Estimates economic values by having people market among the ecosystem's services.
8. **Benefit Transfer Method (BTM) or Value Transfer Method –** Transfers a study done from one area to another to estimate the economic value of that location.
9. **Abatement Cost Method –** The cost of an intervention that will reduce one unit of the pollutant

The economic evaluation aims to value the impact on human well-being caused by changes in the surrounding ecosystem or environment due to harmful emissions and negative impacts by commercial or industrial sectors. Standard Damage Cost is calculated where the damage is

assessed based on on-ground analysis. The industries/institutions must have valid data sets to be used for this analysis. Damages to human health, the environment, water resources, and land use are considered in the Damage Cost calculation. Estimates incorporate externalities caused by air pollution, water pollution, and land environment using the Value Transfer Method (VTM) and Shadow price method.

### 5.3.2 DC-I and DC-II Distinction

In this assessment, two complementary approaches have been adopted for estimating environmental damage costs, based on the nature and availability of data. The first, referred to as DC-I, is applicable when environmental damage is measurable and observable on the ground. This approach relies on quantifiable parameters—such as kilograms of pollutants like PM10 emitted beyond permissible limits—and applies valuation rates per unit of damage as provided in this report. It allows for direct application of cost metrics where violations can be clearly monitored and recorded.

The second approach, DC-II, is designed for situations where direct measurement of environmental damage is not feasible, such as in retrospective assessments or where monitoring data is unavailable or incomplete. In such cases, damage cost estimation is based on documented evidence of non-compliance, such as regulatory reports, inspection findings, or the number of days environmental standards were violated. DC-II offers a valid and structured alternative to DC-I, ensuring that even in the absence of measurable data, environmental harm can be systematically assessed and valued based on credible secondary information. Both approaches are aligned in intent and outcome, and their use depends on the specific context and data accessibility in each case.

### 5.3.3 Methodology for Calculation of DC-I

DC-I is applicable in cases involving the release of pollutants into the air, water, land, or in the form of solid and hazardous waste, where environmental externalities are evident. DC-I accounts for the costs associated with negative externalities resulting from the discharge of pollutants beyond prescribed standards, which takes into account the costs of human health, environment, water resources, and land.

DC-I assessment has been carried out using various methods which *inter-alia* includes, Value Transfer Method (VTM), shadow price method for quantifying impact per unit weight of specific pollutant released in excess of environmental standards, in accordance with the methodologies prescribed in Schedule-I. Damage scenarios pertaining

to DC-I are provided in Table 1. The methodologies envisaged for assessing damage cost under different case scenarios falling within the scope of DC-I are detailed in **Schedule-I.**

# Schedule-I

**Table 1:** Methods for assessing standards damage cost for different damage scenarios wrt DC-I:

| S.No | Cause | Damage Scenario | Method |
|---|---|---|---|
| 1. | Damage Cost due to Air pollution (externality cost) | Release of air pollutants in excess of prescribed standards | Value Transfer Method |
| 2. | Damage Cost due to Water pollution (externality cost) | Water pollution due to the release of pollutants | Value Transfer Method |
| 3 | Damage Cost for Soil Pollution (externality cost) | Toxic and Heavy Metal Pollution | Value Transfer Method |
| 4 | Damage Cost due to accidental releases in environment | Release of specific pollutants in excess of prescribed standards | Value Transfer Method, Relative toxicity |
| 5 | Pollution in CRZ | Pollution and damage in CRZ | Based on classification:<br>1. Executing activities in prohibited areas<br>2. Carrying out permissible activities without prior clearance<br>3. Non-compliance with regulatory norms |
| 6 | Oil Spills | Death of aquatic life, marine eco-system damage, contamination of beaches | USEPA - Oil Spill Response Cost-Effectiveness Analytical Tool |
| 7 | Environmental Damage Cost of Sand Dunes | Loss of balance in coastal water quality, degradation of water quality. | Eco-system Service values<br>• Provisioning – by VTM<br>• Regulating – by VTM<br>• Carbon Sequestering – by VTM<br>Monetary Loss Rs. 49 Lakhs/ha./yr |
| 8 | Damage Cost for the loss of Ecosystem Services | Damage to Ecosystem Services | Avoidance Cost Method |

*Both the DC-I and DC-II are applicable based on case to case basis

### 5.3.4 Methodology for Calculation of DC-II

DC-II is applied in cases where on-ground environmental damage is not measurable. In such case, the assessment shall be carried out using established methodologies, including but not limited to the Avoidance Cost Method, Value Transfer Method, and recommendations made by in-house committees of CPCB. The damage cost have been determined based on parameters such as savings in treatment cost, capital expenditure, operation and maintenance (O&M) costs, and other relevant costs. These methods envisaged for assessing damage costs i.e. DC-II for different case scenarios are at Schedule-II.

# Schedule-II

**Table 2:** Methods for assessing Damage Cost for different damage scenarios wrt DC-II

| S.No | Cause | Damage Scenario | Method |
|---|---|---|---|
| 1 | Non-Compliance in Industries and Common Effluent Treatment Plants | Damage to recipient environment due to release of water/air pollutants. | DC formula, based on pollution potential, quantum release, sensitivity of receptor area and type of facility |
| 2(a) | Illegal Extraction of Ground water | Depletion of groundwater resources | Based on water consumption, type of use (industry, mining, infra, dewatering, drinking, packaged drinking, domestic), scarcity (CGWA). |
| 2(b) | Ground Water Contamination | Ground Water Pollution by point and non point sources | -As provided for DC-I(2) above for point sources.<br><br>-As provided for DC-II (1) above for non point sources. |
| 3 | Unauthorized disposal or dumping of hazardous waste | Contamination of soil and groundwater, impact on health and environment. | formula is based on pollution potential, environmental risk factor, quantity of hazardous waste ,etc. |
| 4 | Non-compliance to Biomedical Waste Management Rules | Risk of infections, spread of diseases and injury. | Formula is based on health risk factor, and type and scale of health care facilities, etc. - |

| | | | |
|---|---|---|---|
| 5 | Non-compliance to Plastic Waste Management Rules | Choking of drains, health impacts animals, ecological damages due to microplastics | Avoidance Cost |
| 6 | Discharge of untreated Sewage by individual/authority | Discharge of untreated sewage by the concerned individual/authority | Avoidance Cost |
| 7 | Non-Compliance to Solid Waste Management Rules | Contamination of groundwater, air pollution, and soil | Avoidance Cost |
| 8 | Non-compliance to Electronic Waste management Rules, | Impact on health of workers due to exposure to toxic metals, contamination of soil, release of water and air pollutants | Quantum released into environment. |
| 9 | Non-Compliance to Battery Waste Management | Improper collection and storage, Non-fulfilment of EPR Obligations, unauthorized recycling or disposal | Avoidance Cost |
| 10 | Non-compliance to Tyre Waste Management Rules | Other non-compliances of Hazardous and Other Waste (M & TM) Amendment Rules, 2022 and amendments thereof by Producers / Recyclers / Retreaders. | Avoidance Cost |
| 11. | Mining- OB Dump and Muck Management | Non-Compliance to Mining OB Dump and Muck Management | Avoidance Cost |
| 12 | Non-compliance to Energy Conservation measures | ECBC non-compliance | Avoidance Cost |
| 13 | Non-Compliance w.r.t. Green Belt and Green Cover | Non existing or Shortfall in Green Belt/ Green Cover | Avoidance Cost |

## 5.4 Remediation Cost (RC)

Remediation/Restoration cost focuses on repairing the damage caused by human activities to natural ecosystems and restoring them to an earlier state or another state that is closely related to one that has not been altered by

human activities. Ecological restoration is distinguished from the practice of conservation, which is primarily concerned with preventing further losses to ecosystems. The cost of restoring the damages is usually many folds higher compared to the cost of the business carried out on the premises. This cost will depend on the site specific conditions and shall be estimated on case-to-case basis. The Remediation Cost shall be assessed as per the guidelines issued by CPCB.

(https://cpcb.nic.in/uploads/hwmd/Guidelines_Environmenal_Damages_Costs_200116.pdf)

In case of Non-compliance of environmental approval conditions which causes damage to the environment, additional Remediation/Restoration Costs may have to be imposed over and above EDC on the basis of remediation plan prepared based on detailed on-site evaluation by the experts. Remediation/Restoration cost calculation shall be applicable in case on-ground damage assessment is visible, measurable and quantifiable i.e., DC-I.

## 5.5 Fixed Penalty Cost (FPC)

Fixed Penalty Cost is the cost imposed as fine/penalty on any person/ company/ government department for contravention or non-complying with any of the provisions of Air (PCP) Act 1981, Water (PCP) Act 1974, and Environmental (P) Act 1986 (as amended time to time) or the rules made or orders or directions issued thereunder for which no penalty is prescribed, that has caused or has the potential to cause environmental damage directly or indirectly.

Note: With regard to the FPC, the following scenerios shall be taken into account:

(i) FPC may be imposed by the adjucating officer at their discretion in accordance with the provisions of the Jan Vishwas Act.
(ii) Penalties already defined for specific scenarios may be applied in place of the FPC.
(iii) In case of any ambiguity for the calculation of FPC, the following methodology may be adopted.

However, all the aforementioned scenarios for Fixed Penalty Calculation (FPC) shall be reviewed during evaluation, and the highest value derived from these scenarios shall be considered as the final FPC to be imposed.

### 5.5.1 Applicability of Fixed Penalty Cost

According to the provisions pertaining to penalties under Water (PCP) Act, 1974; Air (PCP) Act, 1981 and the Environment (P) Act, 1986, as amended from time to time, a person/company/government department in contravention of the provisions under these Acts is liable to pay penalties as applicable below:

### 5.5.2 Penalties under Water (PCP) Act, 1974 (Amendment) whoever;

(i) In contravention to (sub-section (2) or (3) of section 20)

- Fails to comply with the directions pertaining to abstraction of water in quantities at a specific location, which is substantial in relation to the flow in the stream
- Fails to comply with the directions pertaining to discharging a trade effluent or sewage into a well or stream
- Fails to furnish information regarding the construction, installation, or operation of the establishment or of any disposal system or of any extension or addition thereto.

(ii) In contravention to subsection (1) (c) of section 32

- Fails to comply with orders for immediately restraining or prohibiting the person concerned from discharging any poisonous, noxious or polluting matter [into the stream or well or on land], or from making insanitary use of the stream or well.

(iii) In contravention under sub section (2) of section 33, in reference to application made by Boards to courts for restraining apprehended pollution of water in streams or wells.

- Fails to comply with orders passed by court

(iv) In contravention under Section sub section (3) of 33 of Water Act,

- Fails to comply with orders passed by court

(v) In contravention under section 33A,

- Fails to comply with the directions issued by Board in respect to water act
- Fails to comply with for closure, prohibition or regulation of any industry, operation or process

(vi) In contravention of provisions under Section 42;

- Destroys, pulls down, removes, injures or defaces any pillar, post or stake fixed in the ground or any notice or other matter put up, inscribed or placed, by or under the authority of the Board
- Obstructs any person acting under the orders or directions of the Board from exercising his powers and performing his functions under this Act
- Damages any works or property belonging to the Board

- Fails to furnish to any officer or other employee of the Board any information required by him for the purpose of this Act
- Fails to intimate the occurrence of any accident or other unforeseen act or event under section 31 to the Board and other authorities or agencies as required by that section; or, in giving any information which he is required to give under this Act, knowingly or wilfully makes a statement which is false in any material particular; or, for the purpose of obtaining any consent under section 25 or section 26, knowingly or wilfully makes a statement which is false in any material particular.

(vii) In contravention of provisions under Section 24, 25 or 26;

- Knowingly cause or permit any poisonous, noxious or polluting matter beyond the standards as may be laid down by the State Board to enter (whether directly or indirectly) into any stream or well or sewer or on land
- Knowingly or wilfully alters or interferes with that device such as meter or gauge or other measure or monitoring device is required and such device is used so as to prevent it from monitoring or measuring correctly.

(viii) As per the provisions under section 45A, contravening any of the provisions of this Act or any order or direction issued thereunder, for which no penalty has been provided,

- Procedural violations, such as not having Consent To Establish/ Operate (CTE/CTO)
- Violation of the prescribed conditions, with the potential to cause direct or indirect environmental damage or any other violation of this nature
- Accidental discharges lasting for short durations resulting into damage to the environment
- Intentional discharges to the environment resulting into acute injury or damage to the environment
- Any other violation with potential to cause direct or indirect damage to the environment.

### 5.5.3 Penalties under Air (PCP) Act, 1981 - whoever;

(i) In contravention under Section 22;

- fails to comply with the discharge standards for air pollutants laid down by SPCBs/PCCs

(ii) In contravention under Section 31A;

- Fails to comply with the directions issued by Board in respect to Air Act

- Fails to comply with for closure, prohibition or regulation of any industry, operation or process
- Release of treated, partially treated or untreated flue gases or process emissions into ambient air
- Any illegal bypass discharge of partially treated or untreated air emission.

(iii) In contravention under Section 38;

- Destroying, pulling down, removing, injuring or defacing any pillar, post or stake fixed in the ground or any notice or other matter put up, inscribed or placed, by or under the authority of the Board
- Obstructing any person acting under the orders or directions of the SPCBs/PCCs from exercising his powers and performing his functions under the Air Act, 1981
- Damages any works or property belonging to the SPCBs/PCCs
- Failing to furnish to the Board or any officer or other employee of the Board any information required by the Board or such officer or other employee for the purposes of this Act
- Fails to intimate the occurrence of the emission of air pollutants into the atmosphere in excess of the standards laid down by the State Board or the apprehension of such occurrence, to the SPCBs/PCCs and other prescribed authorities or agencies as required under sub-section (1) of section 23 of Air Act, 1981 as amended
- Fails in giving any information which he is required to give under this Act, makes a statement which is false in any material.

(iv) In contravention under Section 38, contravening any of the provisions of this Act or any order or direction issued thereunder, for which no penalty has been provided,

- Procedural violations, such as not having Consent To Establish/ Operate (CTE/CTO)
- Violation of the prescribed conditions, with the potential to cause direct or indirect environmental damage or any other violation of this nature.
- Accidental discharges lasting for short durations resulting into damage to the environment
- Intentional discharges to the environment resulting into acute injury or damage to the environment.
- Any other violation with potential to cause direct or indirect damage to the environment

### 5.5.4 Penalties related to the E (P) Act, 1986 – Whoever

(i) In contravention of provisions of sub-section (2) , (3) of section 10;

- Fails to render assistance to person empowered by the Central Government the right to enter, at all reasonable times with such assistance as he considers necessary
- Wilfully delays or obstructs any person empowered by the Central Government in the performance of his functions.

(ii) In contravention of provisions of section 7 and section 8, the person;

- Fails to meet the prescribed emission or discharge standards of environmental pollutants in any industry, operation or process
- Fails to comply with the prescribed safeguards while handling any hazardous substance.

(iii)In contravention of provisions of section 9, 10 and 11; the person;

- Fails to furnish information to authorities when he discharge of any environmental pollutant in excess of the prescribed standards in certain cases
- Fails to furnish information when it is apprehended that discharge of any environmental pollutant in excess of the prescribed standards likely to occur due to any accident or other unforeseen act or event
- Fails to prevent or mitigate the environmental pollution caused due to discharge of any environmental pollutant in excess of the prescribed standards due to any accident or other unforeseen act or event
- Fails to be attend when called upon to render all assistance during environmental pollution caused due to any accident or other unforeseen act or event
- Obstructs any person empowered by the Central Government the right to enter, at all reasonable times with such assistance as he considers necessary
- Wilfully delays or obstructs any person empowered by the Central Government for the purpose of performing any of the functions of the Central Government entrusted to him
- Obstructs the Central Government or any officer empowered by it in this behalf, to take, for the purpose of analysis, samples of air, water, soil or other substance from any factory, premises or other place in such manner as may be prescribed.

(iv)In contravention of provisions of E(P) Act or the rules made or orders or directions issued thereunder for which no penalty is provided,

- Fails to comply with conditions of authorization or registrations issued by SPCBs/PCCs/CPCB under various waste management rules such as Hazardous Waste Management Rules, Biomedical Waste Management Rules, Plastic Waste Management Rules, C&D Waste Management Rules, E-Waste Management Rules, etc

- Fails to comply with procedural violations, such as delay in renewal of Consent to Establish/ Operate (CTE/CTO) or violation of the prescribed conditions, with potential to cause direct or indirect environmental damage or any other violation of this nature
- Fails to take prior Environmental Clearance for new or expansion of the projects
- Any other violation of conditions of consent or Environmental Clearance having potential to cause direct or indirect damage to the environment;
- Accidental discharges lasting for short durations resulting into damage to the environment
- Intentional discharges to the environment resulting into acute injury or damage to the environment
- Any other violation with potential to cause direct or indirect damage to the environment.

***NOTE***

i) *Penalty amount to be credited to Environmental Protection Fund.*

ii) *No penalty shall be imposed without giving the person concerned a reasonable opportunity of being heard.*

**iii)** *The minimum and maximum limit of applicable penalties under Air (PCP) Act, 1981, Water (PCP)Act, 1974 and E(P) Act, 1986 for contraventions of the provisions is guided by JV Act and is summarised at* ***Table-1.***

### 5.5.5 Method for Calculating Fixed Penalty Cost

FPC is to be assessed based on the formula developed by CPCB as part of "Report of the CPCB In-house Committee on Methodology for Assessing Environmental Compensation and Action Plan to Utilize the Fund", which takes into consideration, the pollution potential, extent of exposure to population, size of operations, and potential to cause ecological damage. The simplified generic formula is used for FPC also by aligning with provisions for penalty notified under Air (PCP) Act, 1981, Water (PCP) Act, 1974 and E(P) Act, 1986 as given below:

$$\mathbf{FPC} = (\mathbf{PI} \times \mathbf{S} \times \mathbf{LF} \times \mathbf{N} \times \mathbf{R}) \text{……. (Equation 5)}$$

Where,

**FPC** = Fixed Penalty Cost in ₹
**PI** = Pollution Index
**S** = Scale of operation
**LF**= Location factor
**N** = Duration factor
**R** = Rupee factor

**The FPC will be restricted to a minimum of Rs 10,000/- and a maximum of 15,00,000 for each contravention except in case of:**

**(a)** Contravention of Section 7 (Persons carrying on industry, operation, etc., not to allow emission or discharge of environmental pollutants in excess of the standards) or Section 8 (Persons handling hazardous substances to comply with procedural safeguards) of E(P) Act, 1986, **where FPC will be restricted to minimum of Rs 100,000/- and a maximum of 15,00,000.**

**(b)** Contravention of Sections 9 (Furnishing of information to authorities and agencies in certain cases), Section 10 (Powers of entry and inspection) and Section 11 (Power to take sample and procedure to be followed in connection therewith) of E(P) Act, 1986, where FPC will **be restricted to minimum of Rs 10,000/- and a maximum of 5,00,000.**

The above factors for penalty are aligned with the provisions under Air (PCP) Act, 1981, Water (PCP)Act, 1974 and E(P) Act, 1986 as amended from time to time for adjudicating the penalty as below:

(i) Vulnerability of population likely to be adversely affected by such contravention or non-compliance & the area affected due to such contravention or non-compliance (represented in LF);
(ii) Frequency and duration of such contravention or non-compliance (represented in N);
(iii) Damage caused or likely to be caused to any person, as a result of such contravention or non-compliance, if any (represented in PI and S);

The adjudicating officer under Jan Vishwas Act will conclude the FPC. The details on the variables of FPC are as below:

#### 5.5.5.1 Pollution Index (PI)

While calculating FPC, the exact value of Pollution Index (PI) value may be used by referring "Report on Classification of Sectors into Red, Orange, Green, White and Blue Categories (A tool for progressive environmental management) -2025" as amended by CPCB from time to time, which classifies industrial sectors/sub-sectors according to their pollution load, scale of operation, production technology, and type of fuel used into Red Category, Orange Category, Green Category, White Category and Blue Category.

Red indicates the highest pollution potential, requiring stringent regulatory oversight, while White signifies

minimal or no pollution, with much reduced compliance burden of merely intimation to the concerned SPCBs/PCCs. A new Blue Category has also been introduced to distinguish the Essential Environmental Services required for management of environmental concerns arising from anthropogenic pollution due to domestic/household activities which otherwise will have large littering potential.

#### 5.5.5.2 Scale of Operation (S)

The following values of S-factor are assigned in light of the revision of MSME definition[1]

**Table 3**: S-factor.

| S. No. | Classification | Capital (Rs. Crores) | Turnover (Rs. Crores) | S-Factor |
|---|---|---|---|---|
| 1. | Micro | 2.5 | 10 | **0.5** |
| 2. | Small | 25 | 100 | **0.75** |
| 3. | Medium | 125 | 500 | **1** |
| 4. | Large | >125 | >500 | **1.5** |

***NOTE:-***

*(i) S-Factor will apply corresponding to maximum value of either capital cost or turn-over.*
*(ii) The parameters influencing S-Factor in determining FPC shall vary according to the classification of MSME industries published by Ministry of Micro, Small and Medium Enterprises, as amended from time to time.*

#### 5.5.5.3 Location Factor (LF)

**Table 4:** Location Factor (LF) and Vulnerability

| S.No. | Population* | Location Factor (Urban Population) | Location Factor (rural/vulnerable population) |
|---|---|---|---|
| **For the industrial unit located within municipal boundary or up to 10 km distance from the municipal boundary of the city/town** | | | |
| 1. | <1 million | **1** | **1.2** |
| 2. | 1 to ≤ 5 million | **1.25** | **1.5** |
| 3. | 5 to < 10 million | **1.5** | **1.8** |

[1] https://www.dcmsme.gov.in/Notification-S.O-no-1364-E-dated-21.03.2025-Revised-Definition.pdf

| | | | |
|---|---|---|---|
| 4. | 10 million and above | **2.0** | **2.4** |
| **Other cases** | | | |
| 6. | Industry/facility located > 10 km from municipal boundary | **1.0** | **1.2** |
| 7. | Industry/facility located within Notified Eco Sensitive Zone/ Eco Sensitive Area (irrespective of population) | **2.0** | **2.4** |
| 8. | Industry/facility located within Critically Polluted Areas (irrespective of population) | **2.0** | **2.4** |
| 9. | Reserve Forest and Protected area notified under Forest Conservation Act and wild Life Protection Act respectively. | **2.5** | **3.0** |
| 10. | Wetlands having area ≥ 2.25 ha as protected under the Wetlands (Conservation and Management) Rules, 2017. | **2.0** | |
| 11. | Certified Blue Flag Beaches | **2.0** | |
| 12. | Areas under CRZ IA (Ecologically Sensitive Areas ) | **3.0** (since ecologically sensitive areas are highly vulnerable to human developmental activities and climate change & it's consequences like soil erosion, extreme events, these ares requires higest protection measures and managemet) | |
| 13. | CRZ-IB (Intertidal areas ) | **2.5** (Intertidal areas have rich benthic biodiversity and are often in close proximity with Ecologically sensitive area) | |
| 14. | Areas under CRZ II | **1** (urban areas and developmental activites are permitted) | |
| 15. | Areas under CRZ IIIA (50m NDZ) | **1.5** (Populated rural areas (population density >2161 per sq.km, NDZ is 50m only, scope for future developmetal activitites) | |

| | | |
|---|---|---|
| 16. | Areas Under CRZ-IIIB (200 m NDZ) | **2.0** (Less populated rural areas (population density <2161 per sq.km, NDZ is 200m. To ensure the NDZ of 200m it requires highest protection measures |
| 17. | Areas under CRZ IVA (12 nm from HTL-terrotorial waters) | **1.5** (water area, under Blue Economy initiatives, it is envisaged expand the sustainable developmental activities in territorial waters and also in EEZ) |
| 18. | Areas under CRZ-IVB ( tidal influence water bodies (NDZ 50 m or width of creek whichever is less) | **2.0** (most the tidal influenced water bodies are kind of wetlands, so it requires adequate protection measures) |

*Population of the city/town as per the latest Census of India*

**LF is adjusted by inserting a multiplier factor of 1.5 wherein the vulnerability scenario w.r.t vulernable population and vulnerable ecosystem is not being covered in the above table or there is an issue of interpretation w.r.t vulnerability using the above table.*

#### 5.5.5.4 Rupees Factor (R)

R factor is a factor in Rupees ranging between 100-500 based on the extent of violation. However, considering that an average R factor of 250 is being used since 7 years.

The value of Rupee Factor (R) in comparison to Type of Contraventions as per amended provisions under the Water Act, 1974, Air Act, 1981, Environmental (Protection) Act, 1984, the R factor can be revised as below:

**Table 5:** Rupee Factor (R)

| S.No. | Type of Contraventions as per amended provisions under the Water Act, 1974, Air Act, 1981, Environmental (Protection) Act, 1984 | Rupee Factor (R) |
|---|---|---|
| 1. | Non-compliance of environmental approval conditions with DC-I Scenarios | 500 |
| 2. | Non-compliance of environmental approval conditions with DC-II Scenarios | 350 |
| 3. | Non-compliance to environmental approvals, which are only procedural in nature, does not cause any environmental damage | 250 |

| | | |
|---|---|---|

### 5.5.5.5 Duration Factor (N)

N is a factor that represents the duration of non-compliance in days for which the violation took place. This factor represents the number of days for which violation took place is the period between the day of violation observed/due date of compliance of the directions and the day of compliance verified by CPCB/SPCB/PCC/MoEF&CC.

For the determination of 'N' (the actual number of days of environmental violation), a minimum value of 15 days shall be considered. This considers instances where violations may have remained undetected before being formally identified by regulatory authorities. Additionally, if a unit fails to provide evidence of compliance, N will be calculated from the date of observed violation until the date of compliance verification by CPCB/SPCB/PCC/MoEF&CC, with an upper limit of 240.

However, if a unit submits a self-compliance report earlier and is verified and found compliant by CPCB/ SPCB/PCC, then N shall be considered as per the date of compliance mentioned in the self-compliance report submitted by the unit. However, if non-compliance is observed despite the submission of a self-compliance report, then N shall be estimated from the observed violation date till the date of compliance verification by the CPCB/SPCB/PCC/MoEF&CC.

**Table 6:** Duration Factor (N)

| **S. No.** | **No of Days** | **Duration Factor (N)** |
|---|---|---|
| 1 | 1 - 15 days | 15 |
| 2 | 15 – 45 days | 30 |
| 3 | 46 – 90 days | 60 |
| 4 | 91 – 180 days | 120 |
| 5 | 180 – 360 days | 240 |

*Note:* If an industry/facility fails to provide proof of compliance, N factor will be determined by the number of days between the observed date of violation and the date of compliance verification by CPCB/SPCB/PCC, with an upper limit of 240.

Sample calculations wrt variable duration factor (N) for minimum and maximum conditions for rest of the factors in **Table 8.**

**Table 7:** Lower and Upper Penalty Limits as per the Jan Vishwas (Amendment of Provisions) Act, 2023, under amended Air (Prevention & Control of Pollution) Act 1981, and Environment (Protection) Act 1986

| Acts | Sections | Penalty Type | Minimum Penalty | Maximum Penalty | Per Day Penalty for NC |
|---|---|---|---|---|---|
| **The Air (Prevention and Control of Pollution) Act, 1981** | Section 37 Failure to comply with provisions of Section 22 (Persons carrying on industry, etc., not to allow emission of air pollutants in excess of the standard laid down by State Board) or directions issued under Section 31A (Power to give directions) [37(1) & 37(2)] | I | 10,000 | 15,00,000 | 10,000/day |
| | Section 38 Penalties for certain acts (a) to (f) - destroying/removing notice of Board, obstructing the Board official, damage Boards belonging, fails to furnish information, fails to intimate occurrence of exceedance, false statement, [38(1) & 38(2)] | I | 10,000 | 15,00,000 | 10,000/day |
| | Section 38A Penalty for contravention by Government Department. (The head of the Department shall be liable) [38(2)] | | 01 month Basic Salary | | |
| | Section 39 Penalty for contravention of certain provisions of the Act, order and directions under the Act [39] and directions under the Act [30] | I | 10,000 | 15,00,000 | 10,000/day |
| | 38A. Penalty for contravention of any provision of this Act by any Department of the Central Government or the State | | 1 month of basic salary of Dept Head | 1 month of basic salary of Dept Head | |

| Acts | Sections | Penalty Type | Minimum Penalty | Maximum Penalty | Per Day Penalty for NC |
|---|---|---|---|---|---|
| | Government - the Head of the Department shall be liable to pay penalty. | | | | |
| **The Environment (Protection) Act, 1986** | Section 14A Penalty for contravention of Section 7 (Persons carrying on industry, operation, etc., not to allow emission or discharge of environmental pollutants in excess of the standards) or Section 8 (Persons handling hazardous substances to comply with procedural safeguards) [Person] [14(A) (1) & 14(A) (1)] | II | 1,00,000 | 15,00,000 | 50,000/day |
| | Section 14B Penalty for contravention of Sections 9 (Furnishing of information to authorities and agencies in certain cases), S ection 10 (Powers of entry and inspection) and Section 11 (Power to take sample and procedure to be followed in connection therewith) [Person] [14(B) (1) & 14(B) (2)] | III | 10,000 | 5,00,000 | 10,000/day |
| | Section 15 Penalty for contravention of provisions of the Act, rules, orders and Directions [Person] [15B(1) & 15 (B) (2)] | I | 10,000 | 15,00,000 | 10,000/day |
| | Section 15A Penalty for contravention by companies [Company] [15(A)(1 and )15(A)(2)] | I | 1,00,000/- | 15,00,000/- | 10,000/day |
| | 15B. Contravention of the provisions under this Act, by any Department of the Central Government or the State Government, the Head of the Department shall be liable to pay penalty. | | 1 month of basic salary of Dept. Head | 1 month of basic salary of Dept. Head | |

| Acts | Sections | Penalty Type | Minimum Penalty | Maximum Penalty | Per Day Penalty for NC |
|---|---|---|---|---|---|
| **The Water (P&CP) Act, 1974** | Section 41 penalty for contravention to (sub-section (2) or (3) of section 20) pertaining to abstraction of water in quantities at specific location, discharging a trade effluent or sewage and furnishing information regarding the construction, installations or any extension. | I | 1,00,000/- | 15,00,000/- | 10,000/day |
| | Section 41A failing to comply with any order or direction issued under clause (c) of sub-section (1) of section 32 or any direction issued by a court under sub-section (2) of section 33 or any direction issued under section 33A. | I | 1,00,000/- | 15,00,000/- | 10,000/day |
| | Section 42 – failing to comply with the provisions therein with respect to removal or pulls down, or defaces any pillar, post fixed in the ground or any notice issued by or under the authority of the Board; obstructs any person acting under the orders or directions of the Board ; damages any works or property belonging to the Board; Fails to furnish information; Fails to intimate the occurrence of any accident or other unforeseen act; knowingly or wilfully makes false statement for obtaining any consent under section 25 or section 26 etc. | I | 1,00,000/- | 15,00,000/- | 10,000/day |
| | Section 44, 45 and 46 with respect to contravention of provisions under Section 24 , 25 or 26 such as release of pollutants beyond the standards as may be laid down by the State | I | 1,00,000/- | 15,00,000/- | 10,000/day |

| Acts | Sections | Penalty Type | Minimum Penalty | Maximum Penalty | Per Day Penalty for NC |
|---|---|---|---|---|---|
| | Board; wilfully altering device or monitoring device. | | | | |
| | Section 45A for contravention of any provisions of Water Act or any order or direction issued thereunder, for which no penalty has been provided. | I | 1,00,000/- | 15,00,000/- | 10,000/day |
| | Contravention of the provisions under this Act, by any Department of the Central Government or the State Government, the Head of the Department shall be liable to pay penalty. | | 1 month of basic salary of Dept Head | 1 month of basic salary of Dept Head | |

### 5.5.5.6 Calculating FPC against Government Department

- FPC shall include penalty against Department Head for contravening provisions under the Air/Water or E(P) Acts. The penalty shall be equivalent to one month basic salary of Depatment Head. However, the penalty shall not apply if the departmental Head proves/establishes that the contravention was committed without his/her knowledge or that he/she had excercised all due diligence to prevent such contravention.

- In case where the contravention is attributed to any negligence on part of any officer other than Departmental Head, the officer concerned, other than the Department Head, shall be liable to pay FPC equivalent to one month of his/her basic salary. The penalty shall not apply if the Officer concerned proves/establishes that he/she had exercised all due diligence to avoid such contraventi

**Table-8:** Sample calculations are done for variable duration factor (n) for minimum and maximum conditions for rest of the factors as below.

*(**Note:** Minimum and Maximum penalty will be limited within the limits of penalty prescribed under Jan Vishwas Act, 2023)*

## A. GREEN CATEGORY

Duration of non-compliance (N)= 15

| Green | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5 (Micro)** | | **1.5 (Large)** | | |
| **PI** | **25** | **54** | **25** | **54** | **LF** |
| R - 250<br>R - 350 | 46,875<br>65,625 | 1,01,250<br>1,41,750 | - | - | 1.0 |
| R - 500<br>R - 350 | - | - | 6,75,000<br>4,72,500 | 14,58,000<br>10,20,600 | 2.4 |

Duration of non-compliance (N) = 240

| Green | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5 (Micro)** | | **1.5 (Large)** | | |
| **PI** | **25** | **54** | **25** | **54** | **LF** |
| R - 250 | 7,50,000 | 15,00,000<br>(16,20,000) | - | - | 1.0 |
| R - 350 | 10,50,000 | 15,00,000<br>(22,68,000) | | | |
| R - 500 | - | - | 15,00,000<br>(1,08,00,000) | 15,00,000<br>(2,33,28,000) | 2.4 |
| R - 350 | | | 15,00,000<br>(75,60,000) | 15,00,000<br>(1,63,29,600) | |

## B. ORANGE CATEGORY

Duration of non-compliance (N)= 15

| Orange | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5 (Micro)** | | **1.5 (Large)** | | |
| **PI** | **55** | **79** | **55** | **79** | **LF** |
| R – 250 | 1,03,125 | 1,48,125 | - | - | 1.0 |
| R - 350 | 1,44,375 | 2,07,375 | | | |
| R - 500 | - | - | 14,85,000 | 15,00,000 (21,33,000) | 2.4 |
| R - 350 | | | 10,39,500 | 14,93,100 | |

Duration of non-compliance (N) = 240

| Orange | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5 (Micro)** | | **1.5 (Large)** | | |
| **PI** | **55** | **79** | **55** | **79** | **LF** |
| R - 250<br>R - 350 | 15,00,000<br>(16,50,000)<br><br>15,00,000<br>(23,10,000) | 15,00,000<br>(23,70,000)<br><br>15,00,000<br>(33,18,000) | - | - | 1.0 |
| R – 500 | - | - | 15,00,000<br>(2,37,60,000) | 15,00,000<br>(3,41,28,000) | 2.4 |
| R - 350 | | | 15,00,000<br>(1,66,32,000) | 15,00,000<br>(2,38,89,600) | |

## C. RED CATEGORY

Duration of non-compliance (N)= 15

| Red | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5 (Micro)** | | **1.5 (Large)** | | |
| **PI** | **80** | **100** | **80** | **100** | **LF** |
| R - 250<br>R - 350 | 1,50,000<br>2,10,000 | 1,87,500<br>2,62,500 | - | - | 1.0 |
| R - 500<br><br><br>R - 350 | - | - | 15,00,000<br>(21,60,000)<br><br>15,00,000<br>(15,12,000) | 15,00,000<br>(27,00,000)<br><br>15,00,000<br>(18,90,000) | 2.4 |

Duration of non-compliance (N) = 240

| Red | | | | | |
|---|---|---|---|---|---|
| **S-Factor** | **0.5** | | **1.5** | | |
| **PI** | **80** | **100** | **80** | **100** | **LF** |
| R – 250<br><br><br>R – 350 | 15,00,000<br>(24,00,000)<br><br>15,00,000<br>(33,60,000) | 15,00,000<br>(30,00,000)<br><br>15,00,000<br>(42,00,000) | - | - | 1.0 |
| R – 500<br><br><br>R – 350 | - | - | 15,00,000<br>(3,45,60,000)<br><br>15,00,000<br>(2,41,92,000) | 15,00,000<br>(4,32,00,000)<br><br>15,00,000<br>(3,02,40,000) | 2.4 |

**Schedule-I**

# METHODOLOGY FOR CALCULATION OF DC-I

The per Kg cost of the respective emissions/ damages were assessed using Meta-Analysis. These costs are calculated using 2022 as the base year.

This method is applicable for assessing Damage Costs in the following scenarios,

- Release of air pollutants in excess of stipulated norms for PM, Sox, and NOx
- Water pollution due to the release of Pollutants (BOD, COD, and SS)
- Discharge of untreated or partially treated Sewage by the concerned individual/authority
- Illegal Extraction of Ground Water

Please note that for certain parameters, environmental compensation (EC) has been referred for DC-I, considering the original formula derived by CPCB. The components mentioned here in Schedule-I are to be used for DC-I calculations which may also have been derived by EC but their applicability is for DC (I) only.

## 1. Damage Cost due to Air pollution

- Applicable Parameters: PM10, PM2.5, NOx, SOx
- Particulate Matter: Release of PM10, PM2.5
- Oxides of Nitrogen and Sulphur: From combustion of fossil fuel
- Carbon Monoxide: Incomplete burning of fossil fuels and industrial stacks.
- Impacts – Reduced air quality, reduced visibility, impacts on flora, acid rain, reduced yield, damage to crops, wear & tear of materials, damage to property, etc.
- To assess the quantum release, the measured PM is required to be separated in two fractions PM10 (coarse particles), PM2.5 (fine particles) by using emission factors.
- The damage cost of different countries is converted to USD/ton using the exchange rates. This value is converted to INR/ton using inflation and PPP. The rates are computed for the year 2022. VSL, VOLY approach, dose-response function, and IPA approach are used in the calculation.

**Table 9:** Estimation of damage cost due to air pollution

| Study | Country/location | NOx | PM2.5 | PM10 | SOx |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| EEA technical report | Table 27 of the report (€2019/tonne) | 11117 | 51580 | 34518 | 18227 |
| | USD/tonne | 12451 | 57770 | 38660 | 20415 |
| | INR2022/ton | 308833 | 1432857 | 958876 | 506344 |
| Andrew L. Goodkind | US ($2011/ton) | 13000 | 94000 | | 24000 |
| | INR2022/ton | 392171 | 2835698 | | 724008 |
| Jiuchang Wei et al. | China ($2006/Kg) | | | 90.68 | 1.16 |
| | INR2022/ton | | | 2983566 | 38166 |
| Economic Commission for Europe | Russia | 4500 | 110500 | | 34700 |
| | Turkey | 10100 | 90800 | | 23600 |
| | Avg (€2015/ton) | 7300 | 100650 | | 29150 |
| | USD/ton | 8103 | 111722 | | 32357 |
| | INR2022/ton | 218362 | 3010697 | | 871951 |
| CE-Delft | Netherlands (€2015/Kg) | 37.5 | 86.1 | 48.5 | 27.1 |
| | USD/ton | 41625 | 95571 | 53835 | 30081 |
| | INR2022/ton | 1121720 | 2575470 | 1450758 | 810630 |
| H. SCott Matthews et al. | United States ($1992/ton) | 4860 | | 8575 | 2735 |
| | INR2022/ton | 258637 | | 456340 | 145550 |
| | AVG INR/ton(2022) | 459945 | 2463681 | 1462385 | 516108 |

The quantum release rates for PM 10, PM 2.5, $NO_X$ AND $SO_X$ to be considered as below;

PM 10-----Rs: 1462385 Per Ton or Rs: 1462.385 Say **Rs: 1462 Per Kg**.
PM 2.5------Rs: 2463681 Per Ton or Rs: 2463.681 say **Rs: 2463 per Kg.**
NOx----------Rs: 459945 per ton or Rs: 459.945 say **Rs: 460 per Kg.**
SOx ---------Rs: 516108 Per Ton or Rs: 516.108 say **Rs: 516 per Kg.**

Note: The Population Density Index (PDI) should be multiplied with the damage cost arrived from the above calculations. PDI can be calculated as per the equation (i) below:

$$PDI = \left\{\frac{Population\ density\ of\ the\ concerned\ Area}{Pop.density\ of\ India}\right\} \qquad Equation\ (i)$$

**Note:**

- The average of all the values from the table 27 of the EEA report (Schucht, et al, (2021)) in the first case (PM10 emissions) is (shown in the **Table** above) 34518 €/ton for the year 2019. This value is converted to USD using exchange rate of 1.12 (refer: https://www.x-rates.com/).
- The value obtained on conversion is 38660 USD/ton. Further, we will use Purchasing Power Parity (PPP) and Inflation rates to convert the value to INR/ton. The rates are as per 2019 and we are converting them for year 2022. The inflation rates are averaged from 2019 to 2022, we will get 5.57%. The PPP for 2019 is 21.073. Total Inflation = $(1+ (5.57\%))^{2022\text{-}2019} = 1.177$
- The value in terms of INR/ton is obtained as (38660*1.177*21.073) = 958876 INR/ton.

## Linking Total Particulate Matter (TPM) Emissions for industries with $PM_{10}$ and $PM_{2.5}$ Externalities

In industrial emissions regulation, stack emission standards are generally prescribed in terms of Total Particulate Matter (TPM), which includes all solid and liquid particles suspended in gas, regardless of their size. However, from a public health and environmental impact perspective, the most concerning fractions are $PM_{10}$ and $PM_{2.5}$, due to their ability to penetrate deep into the respiratory system and cause systemic health issues.

On the other hand, the economic valuation of externalities, such as those developed in your study, is size-specific, i.e., it is based on the health and environmental damages caused by $PM_{10}$ and $PM_{2.5}$ concentrations in ambient air. Therefore, applying these externality values directly to TPM emissions without resolving the size distribution would lead to misrepresentation or under/overestimation of actual impacts.

To resolve this issue, the following approach is proposed:

1. Regulatory Compliance Based on TPM
    - Stack emissions should continue to be monitored and regulated based on TPM as per the prevailing regulatory standards (e.g., 50 or 150 mg/Nm³, depending on the category and fuel type).
    - Facilities exceeding these TPM limits are non-compliant and subject to regulatory penalties.
2. Establishing Fractional Composition of $PM_{10}$ and $PM_{2.5}$
    - For stacks with TPM exceedance or for impact assessment purposes, stack sampling should be carried out using size-selective sampling techniques (e.g., impactors or cascade cyclones) to determine the mass fractions of $PM_{10}$ and $PM_{2.5}$ within the TPM.
    - This provides a ratio or percentage: PM 10/TPM and PM2.5/TPM

3. Translating TPM into $PM_{10}$ and $PM_{2.5}$ Quantities

    - Using the above ratios, TPM measurements (mg/Nm³ or kg/year) can be converted into size-resolved mass emissions:

      PM10=TPM×(PM10/TPM); PM2.5=TPM×(PM2.5/TPM)

4. Application of Externality Values

    - The converted mass of $PM_{10}$ and $PM_{2.5}$ emissions can now be multiplied with their respective externality values (in ₹/kg or $/tonne) to estimate the monetary value of damages caused by emissions from each stack.
    - This aligns the health and environmental damage costs with the actual harmful particle fractions, thereby improving both the scientific robustness and policy relevance of the analysis.

## 2. Damage Cost due to Water pollution

Water pollution adversely affects every sector of our environment. Consumption of contaminated water can induce several acute and chronic waterborne diseases in humans. Contaminants are accumulated in fishes and several living organisms in water bodies. These contaminants consequently enter the human ecosystem and cause numerous diseases. Water contamination also leads to a reduction in oxygen levels, negatively impacting fish production and resulting in economic losses.

An increase in toxicity, algal blooms, water congestion, malodorous odors, and other factors can diminish the recreational appeal of water bodies. The eutrophication of water bodies not only harms the fishery industry but also diminishes the potential sale value of local properties. Furthermore, the eutrophication and acidification of water bodies can negatively impact the estimated sale value of the properties. Additionally, incidents such as oil spills decrease the aquatic life population, subsequently impairing the seafood industry.

Damage Cost should be recovered from individuals/authorities /organizations in case of discharge of pollutants in water bodies and failure to operate sewage and effluent treatment plants. The Compensation/ Damage shall comprise two components:

- Environmental damage cost per kg of pollutants by shadow pricing/value transfer method.
- Cost saved/benefits achieved by the concerned individual/authority/organization either by not having a proper treatment plant or inadequate capacity treatment system by the avoidance cost method.

The damage cost can be calculated on the basis of the BOD, COD, and TSS parameters. The damage cost levied due to water pollution can be estimated using the shadow pricing method given at the Tables below.

**Table 10:** Estimation of Damage Cost due to Water Pollution Using Shadow Pricing Method

| Study | Currency | BOD | COD | TSS | year |
|---|---|---|---|---|---|
| Asha Gunawardena et al | $/Kg | 25.48 | 14.76 | 13.39 | 2016 |
| | INR/Kg | 677 | 392 | 356 | 2022 |
| Bishwanath Goldar et al | INR/Kg | | 430 | | 2001 |
| | INR/Kg | | 1539 | | 2022 |
| Murty and Kumar | INR/ton | 246000 | 77500 | | 1994 |
| | INR/Kg | 1540 | 485 | | 2022 |
| Sukanya Das et al. | INR/ton | 57428 | 216855 | 71571 | 2018 |
| | INR/Kg | 70 | 266 | 88 | 2022 |
| CPCB Document | INR/ton | 1054164 | 333993 | | 2018 |
| | INR/Kg | 1293 | 410 | | 2022 |

The mean values per Kg can be considered as following

- BOD: Rs. 716 per Kg
- COD: Rs. 515 per Kg
- TSS: Rs. 222 per Kg

**Table 11:** Heavy metal damage cost (INR/Kg)

| Metal | Prices | Year | Prices (INR/Kg) (2022) |
|---|---|---|---|
| Copper | 350 (INR/Kg) | 2019 | 412 |
| Zinc | 70 (INR/Kg) | 2019 | 74 |
| Mn | 28 (INR/Kg) | 2019 | 33 |
| Boron | 2386 (USD/Kg) | 2016 | 63384 |
| Al | 1.91 (USD/Kg) | 2017 | 50 |
| Vanadium | 32000 (INR/Kg) | 2019 | 37568 |

*Note: Inflation rate for year 2016 is 1.335 and for 2017*

## 3. Damage Cost due to Soil Pollution

Soil pollution refers to presence of toxic chemicals (pollutants or contaminants) in soil, in high enough concentrations to pose a risk to human health and/or the ecosystem. In the case of contaminants which occur naturally in soil, even when their levels are not high enough to pose a risk, soil pollution is still said to occur if the levels of the contaminants in soil exceed the levels that should naturally be present.

The damage cost of different countries is converted to USD/ton of soil using the exchange rates and the value is converted to INR/ton using inflation and PPP for the year 2022.

**Table 12 :** Monetary values of damages to soil for various Elements

| Elements | Soil 2022 (INR/Kg) |
|---|---|
| Cr | 26276 |
| Ni | 329 |
| Co | 352 |
| Mn | 33 |
| Al | 50 |
| Sb | 194 |
| Hg | 3038 |
| Cd | 124320 |
| Se | 1324077 |
| As | 945 |
| Cu | 82 |
| Fe | 2 |
| Pb | 60 |
| B | 65778 |
| Zn | 74 |

## 4. Damage Cost due to accidental releases in environment

Accidental release refers to the discharge of any environmental pollutant in excess of the prescribed standards occurs due to any accident or other unforeseen act or event.

The DC Methodology is as follows:

**DC-I = Pollution load x Damage Cost per unit of Pollutant**

Damage cost per unit of pollutant may be estimated as follows-

Inflation adjusted Damage cost per kg of ammonia ($NH_3$) using PPP exchange rate = INR 702

To estimate the damage cost per kg of different hazardous gases, damage cost per kg of ammonia ($NH_3$) will be used as a reference point and relative toxicity of other gases will be estimated using toxicity indices such as LC50 (Lethal Concentration 50%).

Relative toxicity of gas A = (LC50 of Ammonia) / (LC50 of Gas A)
=7338/ LC50 of Gas A

Damage Cost of gas A (INR/unit) = 702 × (Relative Toxicity Factor)

The LC50 value for gases represents the concentration in air that, when inhaled by test animals, will kill 50% of them within a specific exposure time, typically expressed in parts per million (ppm).

*Ammonia as reference:*

Ammonia ($NH_3$) is often used as a base gas for evaluating environmental externalities because it has well-documented, multi-pathway impacts and serves as a balanced reference for comparison. Regulatory bodies like the US EPA and EU have established clear damage values for ammonia, covering its effects on human health, ecosystems, and infrastructure. Unlike gases such as carbon dioxide that primarily contribute to long-term climate change, ammonia causes immediate and localized damage through multiple pathways—it contributes to air pollution via $PM_{2.5}$ formation, leads to soil acidification, and causes water eutrophication. This makes it suitable for benchmarking a wide range of pollutants that have short- to medium-term environmental effects.

Another reason for its suitability is that ammonia is a common emission from agriculture, waste systems, and certain industries, making it a policy-relevant pollutant with a strong data foundation. Compared to other gases like $NO_x$ or $SO_2$, which have more specific regulatory roles or environmental behaviors, ammonia acts as a more neutral and representative reference. When damage values for a target gas are unknown, ammonia's known damage cost can be scaled using relative toxicity or environmental impact factors, providing a practical method for estimating externalities. Its moderate toxicity, multi-media impact, and regulatory importance make ammonia an effective baseline for comparative environmental assessments.

## 5. Damage Cost for Marine Eco System (CRZ)

Coastal pollution occurs when substances used or spread by humans, such as industrial, agricultural and residential waste, particles, noise, excess carbon dioxide or invasive organisms enter the ocean and cause harmful environmental effects in Coastal and marine eco-system. Source of impact are various projects and activities attracting clearance under CRZ 2011. The majority of this pollution load (80%) comes from land-based activity, although marine transportation significantly contributes as well.

General Impacts are hindrance to marine, activities, impairment of quality of seawater (EUTROPHICATION), reduction of amenities, loss of aesthetic beauty, impacts on the

sensitive habitats, agricultural run-off, municipal and industrial wastes, oceanic dumping and offshore oil spills.

A structured damage cost estimation framework is necessary to quantify economic losses from environmental violations. This estimation is based on the loss of ecosystem services due to anthropogenic activities. The approach considers three types of violations and applies different cost estimates accordingly.

**Table 13:** Violation Type and Estimated Loss Considered

| **Violation Type** | **Damage Cost Basis** | **Estimated Loss Considered (₹/ha/year)** |
|---|---|---|
| Executing Activities in Prohibited Areas | Maximum ecosystem loss per hectare | **Maximum Value** |
| Carrying Out Permissible Activities Without Prior Clearance | If less than 2 years – **Minimum Value**<br>If greater than 2 years – **Maximum Value** | |
| Non-Compliance with Regulatory Norms | | |

**Table 14:** Ecosystem Type and the Estimated Loss of Ecosystem Services

| **Ecosystem Type** | **2013 Estimate (₹/ha/year) in lakh** | **2025 Estimate (₹/ha/year) in lakh** |
|---|---|---|
| Forests | 4-12 | 7.6–22.8 |
| Wetlands | 5-15 | 9.47-28.42 |
| Rivers | 6-12 | 11.4–22.8 |
| Mangroves | 6.5–20 | 12.36–38.02 |
| Coral Reefs | 10–25 | 19.01–47.53 |
| Seagrass Beds | 5–12 | 9.5–22.8 |
| Marine Fisheries | 5–15 | 9.5-28.5 |

| | | |
|---|---|---|
| Water bodies (uncategories) | 3–8 | 5.7–15.2 |
| Open Ocean & Coastal Areas | 4–12 | 7.6–22.8 |

## 6. Damage Cost due to Oil Spills

The USEPA Basic Oil Spill Cost Estimation Model (BOSCEM) can be developed with a methodology for estimating oil spill costs, including response costs and environmental and socioeconomic damages, for actual or hypothetical spills. In a very conservative approach, the cost of the damage can be considered equivalent to the clean-up costs, if it was undertaken. Other costs such as fisheries loss can be computed only if the data of fishing during that period and for the area of impact is available.

The Oil Spill Response Cost-Effectiveness Analytical Tool (OSRCEAT) of USEPA can be more suitable with some minor modifications. It offers a method for quickly estimating costs for various types of spills based on a number of factors.

**Table 15:** Example of cost of clean-up response/ gallon
(based on OSRCEAT method)

| **Oil Type** | **Response Type (Cost in US Dollars)** | | | |
|---|---|---|---|---|
| | **No Response** | **Mechanical** | **Burn** | **Dispersant** |
| Medium Crude | 0 | $28 | $23 | $28 |
| Gasoline | 0 | $12 | NA[1] | NA[2] |
| Jet Fule | 0 | $12 | NA[3] | NA[4] |
| Disel | 0 | $15 | $13 | $14 |
| Lt Crude | 0 | $23 | $18 | $19 |
| Hvy Crude | 0 | $36 | $29 | $30 |
| No.6 Fuel | 0 | $37 | $30 | $31 |
| IFO | 0 | $28 | $28 | $24 |
| Lube Oil | 0 | $26 | $21 | $22 |

IN situ burning (ISB) is genrally not recommended for gasoline spills.
[2]Dispersant is genrally not recommended for gasoline spills.
[3]ISB is generally not recommended for jet fuel spills.
[4]Dispersent is generally not recommended for jet fuel spills.

## 7. Damage Cost of Sand Dunes

Coastal sand dunes have been distributed in all coastal states coast of India. All over the mainland coast sand dunes have been distributed in 1231 patches with a total sand dune area of 32445 ha. The benefit transfer method to be applied to estimate the goods and services of sand dunes.

Services provided by coastal sand dunes include natural water filtration which often benefits people far downstream, the storm protection function of mangrove forests which benefits coastal properties and infrastructure, and carbon sequestration which benefits the entire global community by abating climate change. Option values are derived from preserving the option to use in the future ecosystem goods and services that may not be used at present, either by oneself (option value) or others/heirs (bequest value). Provisioning, regulating, supporting and cultural services may all form part of the option value to the extent that they are not used now but may be used in the future.

Provisioning Services are ecosystem services that describe the material or energy outputs from ecosystems. They include food, water and other resources, they are many minerals being extracted from sand dunes. The sand dunes or sand dunes are washed or used in the construction industry. However, sand mining from sand has been restricted in many countries. Mining for minerals and heavy metals from the sand dunes in south Africa is very heavy but there was no economic estimate on this benefit. The sand dune is also suitable site for asparagus cultivation. At the community level, Marram grass has been used to prepare mats, baskets, weaving and thatching.

Sand dunes are an important source of coastal groundwater. The permeable sand dunes system tends to support a freshwater lens which acts as a barrier to protect from saltwater intrusion into the inland. The freshwater lens is recharged both by direct precipitation and river discharges in the nearshore region. It acts as a buffer against saltwater intrusion. In the Meijendel dunes of Netherlands, dune aquifers have been used as a source of drinking water for centuries. The aquifer supplies enough water for about 1.5 million people in the surrounding cities. Hence, the Meijendel dune has been managed as a nature reserves to supply drinking water needs. It has been estimated that the revenue from the reserve is $99.2 million/year (1991 estimate) however the cost of management of the reserve was estimated as $ 3.8 million / year.

**Regulation Services of Sand Dunes -** Sand Dunes are naturally protecting the coast from storm surges due to their vegetated sandy structure and their height. As s resilient natural barrier to the hazards such as wind and waves, sand dunes are the least expensive and most efficient natural structures against storm surge, flood, and erosion to protect the coastal infrastructure. The stabilized sand dunes protect the recreation and tourism and beaches, oceanfront properties, near-shore developed lands, and wildlife habitats. The town of Misawa is a good example of where coastal sand dunes mitigated tsunami impacts during the Great Eastern japan earthquake. According to witness of the Misawa villagers, the tsunami could not reach the top of the dunes, leaving the village behind the dune undamaged.

Sand dunes disturbance regulation function in Mexico was estimated at $ 67874/ha/yr. In the sand dunes of comarques of Catalonia, Spain, the disturbance regulation function of the sand dunes is estimated at $ 67,400 USD/ha/yr. In south California, the coastal protection function of the sand dunes was estimated using a willing to pay for the home price method of $ 254.0 /30 cm. In the same place (South California), the contingency valuation method was applied to estimate a erosion control program

which estimate the sand dune value at $ 4.45 / household. In Tramore, Ireland, the protection function of sand dunes was estimated at US $ 90000/ha/50 year time scale.

**Carbon Sequestration** are not as productive exporters of nutrients as many other coastal ecosystems. However in Sand dunes grasslands and dune wetlands, Chrono sequences approaches were used to estimate carbon sequestration rates and estimated the carbon density as212 tC/ha. In another study, Carbon Sequestration rate of 1.25-3.12 total carbon dioxide tCO2/ha.yr was estimated for sand dunes. Accordingly, Carbon Sequestration function of sand dunes was estimated between 18.36 and 45.9 £/ha/yr.

**Cultural Services of Sand Dunes -** Coastal dunes also represent an important cultural value . In New Zealand, the earliest human settlements occurred in coastal dunes. Many of the sand dunes areas have archealogical evidence of Maori cultural heritage. Sand Dunes provide tourism and recreational benefits by providing space for walking, beach combing, sunbathing, and scenic attraction. By applying VTM on aesthetic and recreation value of the sand dune and beaches of comarques of Catalonia, Spain was estimated at $36,687 USD/ha/yr.

**Table 16:** Sand Dunes ecosystem services values – minimum, maximum and average ha/yr/Rs.

| Services | Minimum | Maximum | Average |
|---|---|---|---|
| Provisioning Service Water (Drinking Water) – Specific case and DC not considered. | To Conduct Hydro geology study to assess the quantum of sweet water quantum and levy Rs.55 Per Cum as DC | | |
| Regulating Services Disturbance regulation by VTM | 1,10,748.00 | 50,75,715.00 | 28,69,729.00 |
| Carbon sequestration by VTM | 1,336.00 | 3,339.00 | 2,338.00 |
| Cultural services Recreation by BTM | Impact on (Reduction / Change) in Tourist movement in the area to be studied for assessment of damage by BTM (Refer Sampata ) | | |
| Supporting Service Medicinal Value by VTM | 5,88,699.00 | 11,56,704.00 | 8,72,702.00 |
| | **7,00,783.00** | **62,35,758** | **37,44,769.00** |
| | **7 lakhs** | **62 Lakhs** | **37 lakhs** |

**Table 17:** Sand Dunes / Sand Bars – Rs. 49 lakhs per Ha per year

| S.No. | Ecosystems | Monetary loss | Ecological loss | Services considered for valuation |
|---|---|---|---|---|
| 1 | Sand Dunes | Rs. 49 Lakhs/ha./yr | • Reduction in specialized habitats for plants and animals | • Providing habitat<br>• Coastal defense |

| | | | | |
|---|---|---|---|---|
| | | This estimate takes into account potential losses in terms of reduced fisheries productivity, decreased property values, and impacts on coastal protection. | • Decreased species diversity and richness<br>• Disruption of plant communities and native species<br>• Loss of critical nesting sites for birds<br>• Increased vulnerability to coastal erosion<br>• Diminished protection against coastal storms<br>• Disruption of water flow and groundwater recharge<br>• Reduced availability of sand for restoration projects<br>• Isolation of species populations and genetic diversity<br>• Disruption of sand stabilization and nutrient cycling<br>• Alteration of cooler, more humid microclimates | • Water catchment areas<br>• For agricultural purposes<br>• Mining and housing |

## 8. Damage Cost for the loss of Ecosystem Services

**Table 18:** Ecosystem Services Valuation of Land Types (₹/ha/year)

| Land Type | Base ESV (₹/ha/year) | Source / (Base Year) | Years Adjusted | Inflation Multiplier | Adjusted ESV (₹/ha/year) |
|---|---|---|---|---|---|
| Forest Land | ₹6,90,000 | TEEB India (2015) | 9 | 1.55 | ₹10,69,500 |
| Agricultural Land | ₹1,10,000 | Kadaverugu et al. (2016) | 8 | 1.47 | ₹1,61,700 |
| Grazing Land | ₹45,000 | TEEB India (2015) | 9 | 1.55 | ₹69,750 |
| Wetlands | ₹12,00,000 | Verma et al. (2010) | 14 | 2.14 | ₹25,68,000 |

| | | | | | |
|---|---|---|---|---|---|
| Barren/Unused Land | ₹15,000 | MoEFCC (2013 est.) | 11 | 1.83 | ₹27,450 |
| Urban/Community Land | ₹2,50,000 | Singh et al. (2017) | 7 | 1.39 | ₹3,47,500 |

Definition of the above mentioned terms ius discussed below:

a) *Forest Land:*
Forests offer some of the highest-value ecosystem services, including carbon sequestration, biodiversity habitat, soil conservation, air purification, water regulation, and climate moderation. They act as carbon sinks by absorbing $CO_2$, reduce air pollution through particulate filtration, and stabilize local climate through evapotranspiration. Forests also regulate hydrological cycles, prevent soil erosion, and are a key source of non-timber forest products and traditional livelihoods. Their high ecological and economic value has been widely recognized in studies like the TEEB India Initiative.

b) *Agricultural Land:*
Agricultural land provides provisioning services such as food, fodder, fiber, and fuel. Beyond these, it also offers supporting services like soil formation and nutrient cycling. Managed sustainably, agricultural landscapes contribute to pollination, water infiltration, and biological control of pests. The ecosystem service value of agriculture reflects both its production value and its ecological contributions, which are essential for food security and rural livelihoods. Studies like Singh & Pandey (2014) emphasize the need to integrate ecological value in land management decisions.

c) *Grazing Land:*
Grazing lands or grasslands support fodder production, carbon storage, and biodiversity conservation. They serve as critical rangelands for livestock, which is a vital livelihood source in many semi-arid and arid regions. These lands also help in recharging groundwater, regulating soil erosion, and maintaining wildlife corridors. Though often undervalued in economic terms, their ecosystem contributions are substantial, especially for pastoral communities. TEEB India highlights their significance in the socio-ecological fabric of rural India.

d) *Wetlands:*
Wetlands are among the most productive ecosystems, offering flood regulation, groundwater recharge, water purification, and carbon sequestration. They support unique biodiversity and serve as crucial habitats for migratory birds and aquatic species. Wetlands filter pollutants, control nutrient loads, and mitigate floods by storing excess rainfall. Their valuation is particularly high due to their

multifunctional ecological roles. As shown by Verma et al. (2015), the loss of wetlands leads to irreversible damage to ecosystem health and local economies.

e) *Barren/Unused Land:*
Though perceived as "wasteland," barren land still contributes ecosystem services like dust regulation, solar reflectance, and can act as potential carbon sinks through reforestation or ecological restoration. These lands also offer cultural services such as landscapes of spiritual or geological significance. Their lower ecosystem value reflects the reduced biological productivity, but they have high restoration potential, which is critical for ecological compensation and land reclamation strategies.

f) *Urban/Community Land:*
Urban and community lands provide a mix of ecosystem services including microclimate regulation, stormwater management, pollution control, green recreational spaces, and aesthetic and cultural benefits. Parks, green belts, and urban forests help reduce the urban heat island effect, sequester carbon, and enhance air quality. These lands are vital for improving mental well-being, social cohesion, and urban resilience. Ecosystem service valuation of urban areas is increasingly recognized in smart city planning and green infrastructure policies.

g) *Water Bodies (Lakes/Rivers):*
Water bodies like rivers and lakes offer a wide range of provisioning and regulatory services. These include drinking water, irrigation, aquatic biodiversity, flood mitigation, nutrient cycling, and temperature regulation. Rivers play a central role in cultural and spiritual life in India, while also supporting fisheries and navigation. Lakes help recharge groundwater and control urban flooding. Studies by Brander et al. and Verma et al. (TERI) emphasize their high ecosystem value and vulnerability to pollution and encroachment.

| | | | | | |
|---|---|---|---|---|---|
| Water Bodies | ₹8,00,000 | Brander et al. (2010) | 14 | 2.14 | ₹17,12,000 |

## Explanation for 2013 as base year for CRZ ESV

The values used for externalities in this analysis have been drawn from multiple secondary sources, many of which do not explicitly mention the base year for their estimations. However, based on the publication timelines and context of the data, it is evident that most of these sources reflect economic conditions closest to the year 2013. In several cases, published reports use valuations that appear to be based on prevailing prices or conditions around 2013, even if not explicitly stated. This temporal clustering provides a logical basis for standardizing our calculations around that year.

To ensure consistency and avoid errors that may arise from arbitrary inflation adjustments, we have therefore considered 2013 as the base year for all externality values. This approach allows for greater comparability across categories and supports transparency in methodology. It also aligns with precedent in many national and international studies where such values are referenced without detailed inflationary corrections, assuming readers will interpret them within the early-2010s context.

Inflation adjustment:

It is to be noted that the current assessment report considers 2025 as the base year for all externality and ecosystem service loss values which are mentioned in the report (excluding for FPC) have been standardized to reflect conditions in this year. However, when these values are used for assessments in future years, it is essential to adjust them for inflation to maintain their economic relevance and purchasing power.

To update the values for any future year, the following standard compound inflation formula should be applied:

$$\text{Value (future year)} = \text{Value in } 2025 \times (1+r)^n$$

where:

- Value in 2025 is the base year value (in ₹ per unit parameter)
- r is the annual inflation rate (expressed as a decimal) which is the average of all the years from 2025 to the future year in which value is being forecasted, and
- n is the number of years between 2025 and the future year of assessment.

For example, if a value is being projected for the year 2030 and the assumed inflation rate is 5.5% (i.e., r=0.055), then n=5. This approach ensures that the economic cost of environmental damages remains realistic and reflective of future price levels, thereby supporting more accurate policy, compensation, and planning decisions. The above inflation is applicable on all values except for FPC.

**Schedule -II**

# METHODOLOGY FOR CALCULATION OF DC-II

Please note that for certain parameters, environmental compensation (EC) has been referred for DC-II, considering the original formulas derived by CPCB. The components mentioned here in Schedule -II are to be used for DC-II calculations which may also have been derived by EC but their applicability is for DC-II only

## 1. Non-Compliance in Industries and Common Effluent Treatment Plants

If the on-ground analysis of the damage cannot be assessed the Damage cost to be assessed as per the formula proposed by CPCB, that takes into consideration the pollution potential and quantum release. DC formula to be used in following scenarios;

- Failing to comply with directions issued under Section 5 of Environmental (Protection) Act, 1986
- Exceedance (in terms of concentration) of notified parameter(s) beyond permissible limit for specified period
- Injection of treated or untreated water or both into ground water (reverse boring)
- Any illegal bypass discharge of partially treated or untreated effluent and emission observed

CPCB's revised linear formula is,

**DC-II = PI x N x $R_{Ind}$ x S x LF**

Where,

**DC-II** is Damage cost in ₹

PI = Pollution Index of an industry or facility

N = Duration Factor

$R_{Ind}$ = A factor in Rupees for DC, which will also capture degree of violation wherever applicable

S = Factor for scale of operation

LF = Location factor

**Rupees Factor ($R_{Ind}$) –** It signifies degree or extent of violation, value of which will range from ₹100 to ₹500. R should be calculated for all applicable cases listed below and maximum value will be final R for calculation of DC,

**Table 19:** Applicable cases and final $R_{Ind}$ for calculation of DC

| | **Case I: Non-toxic parameters for R based on deviation from standard** | **Case II: Toxic parameters for R based on deviation** | **Case III: For all parameters for which either deviation cannot be measured** |
|---|---|---|---|
| Parameters | Non-toxic physio-chemical parameters such as COD, BOD, TSS, TDS, Cl, PO4, SO4, NO2, PM, SOx, NOx, NH3, etc. | Potential toxic parameters such as Heavy metals, Pesticides, Phenols, Cyanide, Benzene, Hexavalent Chromium, Benzo pyrene etc. | Bio-assay test parameters, etc. |
| Factor in Rupee (R) (in INR) | R=(O.V. – S.V. / S.V.) x 100 | R=(O.V. – S.V. / S.V.) x 100 x 1.5 | R = Rs. 500 (fixed) |

Where, O.V.= Observed value, S.V. = Standard Value

NOTE

- The final $R_{IND}$ will be the maximum $R_{IND}$ calculated from above mentioned cases and not summation.
- In case, calculated $R_{IND}$ doesn't fall in the range of Rs. 100 – 500, the upper value i.e. Rs. 500 or lower value i.e. Rs. 100 shall be considered, as the case may be.

- R factor for pH is depended on prescribed standard for an industrial sector. For example, the pH standard range for sugar industry is 5.5-8.5, then R – Factor is as follows,

**Table 20:** pH range Vs Rupee Factor

| pH – Acid Range (5.5-1) | pH – Alkaline Range (8.6-14) | Rupee Factor ($R_{Ind}$) (in INR) |
|---|---|---|
| 5.5-4.5 | 8.6-9.6 | 100 |
| 4.4-3.5 | 9.7-10.7 | 200 |
| 3.4-2.5 | 10.8-11.8 | 300 |
| 2.4-1.5 | 11.9-13.0 | 400 |
| 1.4-1 | 13-14 | 500 |

*To factor in inflation, Rind can be re-adjusted using the Time Value-based formula:

Final Rupee Value (Rind) = Current R Value × $(1 + i)^n$

Whereas: i = average inflation rate; n = number of years since the violation

**NOTE:**

1. The limit for levying minimum DC per day is as follows,

**Table 21:** Limit for levying minimum DC

| Sr. No. | Units | DC |
|---|---|---|
| 1 | Micro units | Rs.1000 per day |
| 2 | Small units | Rs.2000 per day |
| 3 | Medium units | Rs.5000 per day |
| 4 | Large units | Rs.10000 per day |

2. If the operations of the industry are inevitable and violator continues its operations beyond 03 months then DC is to be increased by 2, 4 and 8 times for 2nd, 3rd, and 4th quarter, respectively. If the operation is inevitable beyond 12 months, violator shall not be allowed to operate.
3. In addition to levying DC and penalty cost, the industry may be prosecuted or closure directions issued, as deemed fit.

4. To factor in inflation, R factor may be re-adjusted every 3 years upon review.
5. A suitable aggregator (weighted summation or min/max) can be applied in case of multiple violation scenarios.

**Operating industrial units having defunct ETP or APCD or operating without installation of ETP or APCD**

In cases where a unit has not installed or has a defunct Effluent Treatment Plant (ETP) or Air Pollution Control Devices (APCD) or any other Pollution Control Device (PCD) needed for meeting the stipulated norms, the DC amount shall be levied based on Avoidance Cost Method using the formula below,

**Damage cost = 4 X Market Rate of PCD (s) + 10% X Annual Operation and Maintenance Cost since the year of operation without installation or defunct PCD (s)**

In case, where externality costs are available following formula can be used,

**Damage cost = No. of years of violation (10%Capital Cost + O&M cost + Externality costs)**

Where,

- The market rate or capital cost will be calculated by SPCB/ PCC/ CPCB based on the actual capacity & type of PCD required to be installed to meet the stipulated standards. The market rate or capital cost will be as on the date of calculation.
- In case more than one ETP, APCD, or PCDs are defunct/ not installed, the total cost will be the summation of all avoided costs.
- Other costs such as reinvestment cost, energy cost, land requirement, conveyance cost, etc. are not included.

**2 (a). Illegal Extraction of Ground Water**

Damage Cost for Ground Water ($DC_{GW}$) is linked to the quantum of groundwater extracted, the criticality of location, period for which such extraction takes place, etc. It can be calculated using the following formula,

**$DC_{GW}$ = Illegal Water extraction per day ($m^3$/day) xDamage Cost Rate for illegal extraction of ground water ($DCR_{GW}$ in Rs./$m^3$) x No. of days of illegal extraction x Deterrent Factor**

The component details are as below,

Damage Cost Rate ($DCR_{GW}$)

Damage Cost Rate ($DCR_{GW}$) is dependent on rate of water consumption and scarcity in the area. The values are comparatively lax for drinking and domestic usage.

**Table 22:** Damage Cost Rate ($DCR_{GW}$) in Rs./$m^3$

| S. No | Area Category | Damage Cost Rate ($DCR_{GW}$) in Rs./$m^3$ | | | | |
|---|---|---|---|---|---|---|
| | | Drinking & Domestic use for institutional activity, commercial complexes, townships, etc. (water consumption in $m^3$) | | | | Drinking & Domestic use for household purposes |
| | | <2 | 2 to <5 | 5 to <25 | 25 & above | |
| 1 | Safe | 4 | 6 | 8 | 10 | Rs 50/- per day |
| 2 | Semi Critical | 12 | 14 | 16 | 20 | Rs 100/- per day |
| 3 | Critical | 22 | 24 | 26 | 30 | Rs 100/- per day |
| 4 | Over-Exploited | 32 | 34 | 36 | 40 | Rs 100/- per day |
| $DC_{GW}$ should not be less than Rs. 50,000/- for institutional activity, commercial complexes, townships, etc. | | | | | | $DC_{GW}$ should not be less than Rs 10,000/- for household. |

**Table 23:** $DCR_{GW}$ for Packaged Drinking Water Units

| S.No. | Area Category | Water Consumption ($m^3$/day) | | | |
|---|---|---|---|---|---|
| | | <200 | 200 to <1000 | 1000 to <5000 | 5000 & above |
| | | Damage Cost Rate ($DCR_{GW}$) in Rs./$m^3$ | | | |
| 1 | Safe | 12 | 18 | 24 | 30 |
| 2 | Semi critical | 24 | 36 | 48 | 60 |
| 3 | Critical | 36 | 48 | 66 | 90 |
| 4 | Over-exploited | 48 | 72 | 96 | 120 |
| *Note :-Minimum $DC_{GW}$ shall not be less than Rs 1,00,000/-* | | | | | |

**Table 24 :** $DCR_{GW}$ for Mining, Infrastructure and Dewatering Projects

| | | Water Consumption ($m^3$/day) |
|---|---|---|

| S. No. | Area Category | <200 | 200 to <1000 | 1000 to <5000 | 5000 & above |
|---|---|---|---|---|---|
| | | Damage Cost Rate ($DCR_{GW}$) in Rs./$m^3$ | | | |
| 1 | Safe | 15 | 21 | 30 | 40 |
| 2 | Semi critical | 30 | 45 | 60 | 75 |
| 3 | Critical | 45 | 60 | 85 | 115 |
| 4 | Over-exploited | 60 | 90 | 120 | 150 |

**Table 25:** $DCR_{GW}$ for Industrial Units

| S.No. | Area Category | Water Consumption ($m^3$/day) | | | |
|---|---|---|---|---|---|
| | | <200 | 200 to <1000 | 1000 to <5000 | 5000 & above |
| | | Damage Cost Rate ($DCR_{GW}$) in Rs./$m^3$ | | | |
| 1 | Safe | 20 | 30 | 40 | 50 |
| 2 | Semi critical | 40 | 60 | 80 | 100 |
| 3 | Critical | 60 | 80 | 110 | 150 |
| 4 | Over-exploited | 80 | 120 | 160 | 200 |
| *Note: Minimum $DC_{GW}$=Rs 1,00,000/-* | | | | | |

The activities, such as packaging drinking water, mining, and industrial processes, involve the extraction of groundwater to enhance the commercial value of the manufactured products. Consequently, these activities are subject to stricter regulations aimed at deterrence and ensuring intergenerational equity. It is proposed to impose the following deterrent factors to compensate for the losses and environmental damages, as detailed in the table below:

**Table 26 :** Deterrent Factor

| S.No. | Water Consumption | Deterrent Factor | | |
|---|---|---|---|---|
| | | < 2 years | 2-5 years | >5 years |
| 1 | <1000 KLD | 1.00 | 1.00 | 1.25 |
| 2 | 1000-5000 KLD | 1.00 | 1.00 | 1.50 |
| 3 | >5000 KLD | 1.00 | 1.25 | 2.00 |
| *Note: The industrial operations may be reviewed and only permitted, if it is safe to continue withdrawal of ground water at the rate permitted.* | | | | |

**NOTE**

- Categorization of area (Over-exploited, Critical and Semi-Critical), as per CGWA shall be considered for calculation of DC, regardless of the area category when the period of violation started.
- For drinking/domestic purposes, minimum DC suggested as Rs 10,000/- (for households) and Rs 50,000 (institutional activity, commercial complexes, townships etc).
- For industrial activity minimum DC is suggested as Rs 1,00,000/-
- In case of fixation of liability, it lies with current owner of the premises where illegal extraction of groundwater is taking place.
- Violation duration may be assumed as at least one year in case where no evidence for period of installation of borewell could be established.
- Central Ground Water Authority (CGWA) reserves the right to relax or interpret these mechanisms in case of any exigency or situation of national strategic importance, as per Guidelines/Criteria for evaluation of proposals/requests for Ground Water Abstraction, 2015.
- Incidence of illegal extraction of ground water, regardless of the category of area (notified or non-notified) will attract the environment compensation.
- The rate of environment compensation will increase as the criticality of ground water availability in the area increases or amount of ground water extraction increases.
- Considering the water as a basic need of human, Damage Cost in case of domestic/household uses are kept low and higher rates of Damage Cost are prescribed for institutional, commercial, infrastructural and industrial purposes by the extraction of ground water.
- Damage Cost Rates ($DCR_{GW}$) for illegal extraction of ground water increases with increase in water consumption as well as water scarcity in the area.
- For illegal industrial ground water abstraction, where metering system is not available, water consumption may be estimated as per consent conditions imposed by SPCB/PCC.
- In addition, all repeated violations will attract DC at 1.25 times the previous DC.
- If the categorization is not available for any scenario, value of water as a resource can be taken as ₹ 60/$m^3$
- Authorities assigned for levy DC and taking penal action are listed below:

**Table 27:** Authorities assigned for levy DC and taking penal action

| S. No | Actions | Authority |
|---|---|---|
| 1. | To seal illegal bore-well/tube-well to stop extraction of water and further closure of project | District Magistrate |
| 2. | To levy $DC_{GW}$ as per prescribed method | District Magistrate/ CGWA |

| | | |
|---|---|---|
| 3. | To levy DC on industries involved in illegal abstraction of Groundwater , as per the method prescribed in report of CPCB- "DC for industrial units" | CPCB/SPCB/PCC |
| 4. | Prosecution of Violator | CGWA under Environment (Protection) Act,1986 (or) |
| | | SPCB/PCC under Water (Prevention and Control of Pollution), Act, 1974 |

## 2 (b). Contamination of Ground Water

In cases of groundwater contamination where a specific point source has been identified, *DC-I (2) of Schedule-I*, pertaining to *Damage Cost due to Water Pollution*, shall be applied.

Conversely, in cases of groundwater contamination where no point source can be identified, *DC-II (I) of Schedule-II*, relating to *Damage Cost due to Non-Compliance with Norms by Operational Industrial Units and Common Effluent Treatment Plants*, shall be enforced.

## 3. Unauthorized disposal or dumping of hazardous waste likely to cause grave injury to the environment

For the purpose of imposing financial penalty and Damage Cost, various violations of HOWM Rules, 2016, can be broadly classified into the following two categories,

1. Category A: Only procedural violations of HOWM Rules, 2016, which have not caused damage to the environment or third-party
2. Category B: Violations causing environmental damage including procedural violations. It is further classified into two categories,

(i) Category B1: In such cases, liability of the responsible party (occupier, operator, transporter, importer, exporter, etc., as the case may be) can be fixed in terms of various required activities and amount of money required in such activities in accordance with provisions laid down under the CPCB's "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty". Copy of the same is available at (https://cpcb.nic.in/uploads/hwmd/Guidelines_Environmenal_Damages_Costs_200116.pdf.

(ii) Category B2: Cases where mismanagement of hazardous or other waste may have caused environmental damage and such damages & remediation required including cost thereof are difficult to assess.

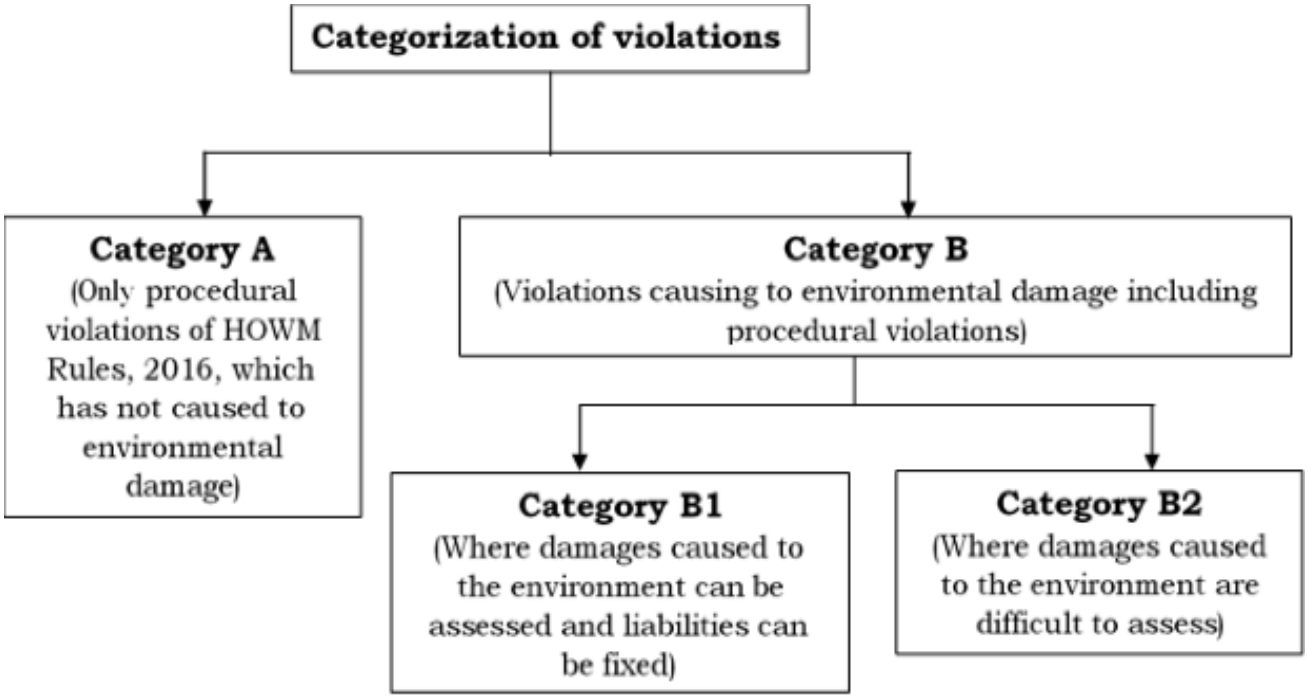


***Figure 2:*** *Categories of violations*

## Calculating Damage Cost

For category B1 violations, steps as suggested in the above section 4(B)(i) may be followed in accordance with provisions laid down under the said CPCB's "Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty". For category B2 violations, Damage cost as suggested below may be considered.

The quantity of hazardous or other wastes, that may have caused environmental damages, may be proportionate to the extent of damages thereof. Damage Cost may, therefore, be directly correlated with the quantity of hazardous or other waste under reference. It may be difficult to assess the extent of damages that may have been caused elsewhere or the damages which have been assimilated by nature. At the same time, sometimes it may not be practically feasible to know the quantity of hazardous or other wastes which have been disposed illegally. For instance, a facility, particularly unauthorised unit, is operating for certain years who has never assessed or documented hazardous or other wastes generated by them and has no document to support that the same have been disposed in environmentally sound manner in compliance with the regulations existing since 1989. Further, such facility may have changed their industrial process or raw materials or products, thereby variation in quantity of the wastes generated during such period. Whereas a facility possessing authorization under the Rules is granted the authorization specifying categories and quantity of the hazardous or other wastes based on declarations made by the unit while making application for the same.

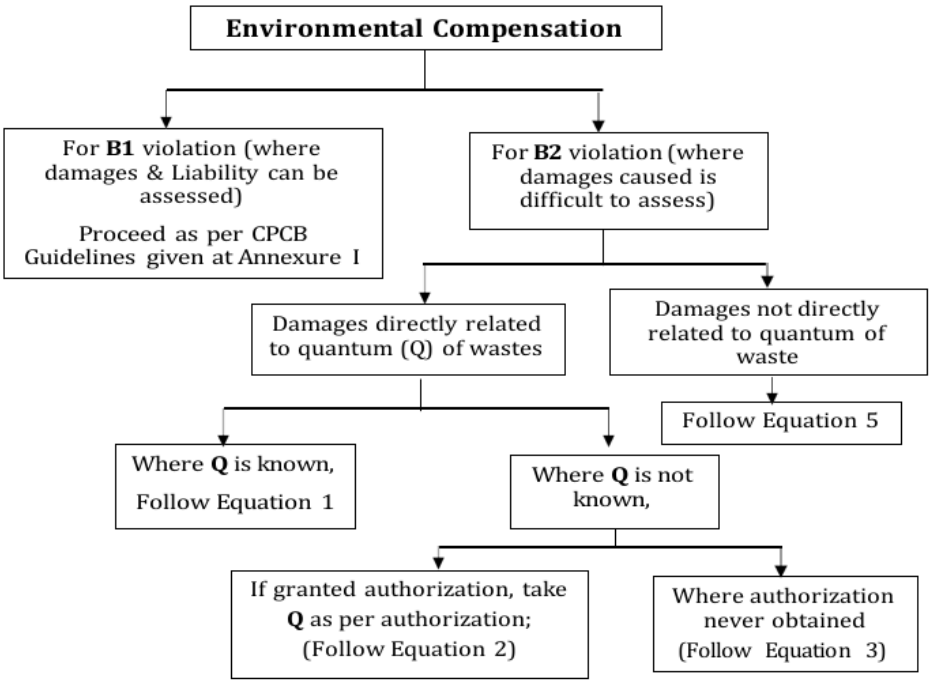


***Figure 3:*** *Approach for calculating Damage Cost in brief*

Under such wide variables, the following quantity based Damage Cost calculation in Rupees may be used and be imposed on violating facility operator:

**Damage Cost (DC) = Q x ERF x $R_{Hz}$**

Where,
**Q** is noticed[2] or observed quantity (in tonne) of hazardous or other wastes which have not been managed in compliance with various provisions of the Acts/Rules/Guidelines/conditions of the authorisation/directions issued by CPCB/SPCB/PCC/MoEF&CC (barring procedural violations which have not caused environmental damage)

**ERF** = Environmental Risk Factor, which is a number (as given in the Table below) denoting the increasing degree of risk to the environment and human health.

**Table 28:** Environmental Risk factor (ERF) for hazardous waste and other waste

[2] **1** Noticed or observed quantity is the reported quantity or that has come to the notice of SPCB/PCC/CPCB/MOEF&CC. For instance, an authorised utilizer has authorisation to utilise 100 tonnes of certain hazardous waste/annum from which 200 tonnes of product is derived whose use has been specified in SOP issued by CPCB for industrial use only. He may have produced say 150 tonnes of product but it has come to the notice (through inspection or complain verification) of SPCB/PCC/CPCB that he has sold 10 tonnes of the product in open market and not to any industry. Here, Q would be 5 tones. Similarly, an authorised industrial unit authorised for 100 tonne of per annum generation of waste has not sent such waste to common TSDF or any other authorised facility nor is found stored in his premise. Here Q would be 100 tonne.

| S. No. | Violation | ERF For Hazardous Waste | ERF For Other* Waste |
|---|---|---|---|
| 1. | When hazardous and other wastes is disposed at unauthorized place or handed over or sold to unauthorized party | 1.5 | 0.3 |
| 2. | When treatment has not been imparted , as required, but only partial treatment has been given (by TSDF/Actual user) | 1.0 | 0.2 |
| 3. | When product (derived from hazardous or other waste) is not confirming to prescribed specification or is specified for restricted use but sold in open market against (in case of actual user) | 1.0 | 0.2 |
| 4. | Wastes found stored beyond the stipulated period (refer Rule 8 of the HOWM Rules, 2008) | 0.1 | 0.05 |

***** *Applicable to waste generated indigenously only.*

**$R_{Hz}$** = The Rupees factor can be derived using table below as below;

**Table 29:** $R_{Hz}$ Value w.r.t type of treatment

| S.No | Type of Treatment | Market Rate (MR) per MT | R Value |
|---|---|---|---|
| 1 | When hazardous and other wastes are disposed at an unauthorised place or handed over or sold to an unauthorised party: that requires pre-treatment for disposal at a TSDF. (Solvent, acids, reactive chemicals, pesticides, toxic chemicals, etc.) | MR for disposal<br><br>Note: Rates of local/nearby TSDF including cost of transportation. * | R = 3 x MR |
| 2 | When treatment has not been imparted, as required, but only partial treatment has been given (by TSDF/Actual user): | MR for pre-treatment<br><br>Note: Rates of local / nearby TSDF including cost of transportation*. | R = 2 x MR |
| 3 | Hazardous Waste that can be disposed directly into landfill / incinerated without pre-treatment/ stabilization | MDR<br><br>Note: Rates of local / nearby TSDF including cost of transportation.* | R = 1.5 x MR |
| 4 | When a product (derived from utilization of hazardous materials) is | MR of the original raw material | R = 3 x MR |

| | | | |
|---|---|---|---|
| | not conform to the prescribed specification or is specified for restricted use but sold in an open market (in case of actual user) | | |
| 5 | Wastes found stored beyond the stipulated period (refer Rule 8 of the HOWM Rules, 2008) | MR<br><br>Note: Rates of local / nearby TSDF including cost of transportation. This rate should be considered even if there has been the scope of utilization of HW in question. | R = 1.0 x MR |

*This rate should be considered even if there has been the scope of utilization of HW in question.

**NOTE:**

For a facility engaged in generation/ recycling/ utilizing/ disposing of hazardous or other waste and such wastes have never been handed over to a common TSDF/ actual user:

***Case I:*** *If authorisation has been taken at any point of time, in such cases, Q may be taken as below:*

**Q** = Quantity in terms of tone/per year, as specified in authorisation (one year =300 days) x **Y**

Where, **Y** is Number of years of operation of the facility and may be considered as given in Table 6 below. In case authorisation is given in quantity/day, then convert in tonne/year by multiplying the same with 300 days.

***Case II:*** *If authorisation has not been taken at any point of time for all or any given category of hazardous or other waste being generated/utilized:*

When above scenario comes to the notice of SPCB/PCC/CPCB, when records are not available on Q, following formula may be used,

**DC = DC (as derived from Equation 1) + (4 times the Market Rate of disposal/ value of HW for days for which violation took place after issuance of directions)**

Apart from the above cases, there could be the following violations or other similar types of violations (which are not covered in the various above-mentioned scenarios) in hazardous waste TSDF or actual user facility:

a) The leachate is illegally disposed or sent to an unauthorized party

b) Violations in leachate management or the leachate management facility require upgradation as per the direction of CPCB/ SPCB/PCC/MoEF&CC
c) Wastewater generated during the process is disposed illegally or not as per the consent conditions
d) Effluent Treatment Plant is not meeting the norms stipulated under EPA, 1986 or CTO issued by SPCB/PCC
e) Effluent Treatment Plant exists but requires upgradation so as to meet the conditions specified under CTO or CPCB guidelines/SOP
f) Treated effluent not managed as per the conditions specified under CTO or CPCB's guidelines/SOP

Under such circumstances, the Damage Cost may be calculated using the formula below,

**Damage Cost (DC-II)= $PI \times N \times R_{Hz} \times S \times LF$**

The DC and Penalty shall be deposited by the violating facility within the stipulated time period specified under directions issued by CPCB/SPCB/PCC. In case such a facility does not submit the same within the stipulated time frame, the amount will be increased. The details are given below:

**Table 30:** Damage Cost Charges and Financial Penalty w.r.t. non-timely submission

| S. No. | Amount Deposition time period | Damage Cost and Financial Penalty Amount |
|---|---|---|
| 1. | Within 15 days from the stipulated time period as directed by CPCB/SPCB/PCC | Original amount with interest @ 12% per annum for number of days delayed after the stipulated date of amount deposition |
| 2. | After 15 days but within 03 months after the stipulated time period as directed by CPCB/SPCB/PCC | Two times the original amount with interest @ 12% per annum for number of days delayed after 15 days of the stipulated date of amount deposition |
| 3. | After 03 months and up to 06 months from the stipulated time period | Four times the original amount with interest @ 12% per annum for number of days delayed after three months of the stipulated date of the amount deposition |
| 4. | After 06 month | Closure of unit/facility |

In case the violators are found repeatedly non-complying with previous violations or new violations, the DC amount and Penalty will be increased as below,

**Table 31:** Damage Cost and Financial Penalty Amount

| S.No. | Time Period for compliance | Damage Cost and Financial Penalty Amount |
|---|---|---|

| | | |
|---|---|---|
| 1. | First time violation | Original amount |
| 2. | Second time violation | Two times the original amount |
| 3. | Third time violation | Four times the original amount |
| 4. | Fourth time violation | Closer of unit and Court case |

## 4. Non-compliance to Biomedical Waste Management Rules

### a). Damage Cost on Health Care Facilities (HCF)

Following violation cases will be considered for levying DC,

- No authorization under BMWM Rules
- No arrangement with Common Biomedical Waste Treatment Facility (CBWTF) for disposal of biomedical waste
- Improper Segregation of generated biomedical waste as per color coded system prescribed under BMWM Rules, 2016
- No facility for pre-treatment of yellow (h) category waste (microbiology, biotechnology and other clinical laboratory waste)
- Storage facility not provided for segregated biomedical waste (applicable for bedded hospitals)
- Effluent Treatment Plant not provided for treatment of wastewater, if sewerage network not connected to terminal STP
- Non-compliance to other responsibilities as stipulated for Health Care Facilities (HCF) under BMWM Rules, 2016

The DC formula is as follows,

**Damage Cost (DC-II) = HR x TS x Rx N**

Where,

**DC**-II is Damage Cost in ₹
HR – Health Risk factor
TS – Type and Size of Health Care Facility
R – Rupees factor
N – Duration Factor

**Table 32:** Health Risk (HR) Factor w.r.t type of violation

| Type of Violation | HR Factor |
|---|---|
| No arrangement for disposal of BMW with CBWTF | 30 |
| Not Applied for Authorization | 10 |
| Improper Segregation of BMW | 20 |
| No pre- Treatment | 10 |
| On-site storage not provided or not adequate | 10 |
| No ETP Despite requirement | 15 |
| Any other violation(s) of BMW Rules | 5* |

** Summation limited to 100*

**Table 33:** TS Value w.r.t type of HCF

| Type & Scale of HCF | TS Value |
|---|---|
| 1 to 10 bedded HCFs | 0.20 |
| 10 to 50 bedded HCFs | 0.30 |
| 50 to 100 bedded HCFs | 0.50 |
| 100 to 500 bedded HCFs | 1.00 |
| 500 and more bedded HCFs | 1.50 |
| Bedded Ayush Hospitals | 0.5 |
| Non-bedded (veterinary hospital, pathological laboratory, blood bank) | 0.2 |
| Non-bedded (clinic, dispensary and clinical establishment) | 0.08 |
| Animal Test Houses | 1.0 |

Note: Minimum Damage Cost in respect to HCF shall not be less than Rs.1200/- per day.

**Table 34:** Increase in Damage Cost amount in case of delay in deposition

| Scenario | Applicable DC |
|---|---|
| Up to 15 days from target date | Original DC |
| Between 15 to 30 days beyond target date | Two times |
| Fails to comply in 2nd inspections including new violations if any | Two times |
| Between 30 to 45 days beyond target date | Four times |
| Fails to comply in 3rd inspections including new violations if any | Four times |
| Beyond 60 days from target date | Closure of HCF |
| Fails to comply in 4th consecutive inspection | Closure of HCF |

## b). Damage Cost for Common Biomedical Waste Treatment Facility (CBWTF)

Following violation cases will be considered for levying DC,

- Incinerator emissions not complying with standards notified under BMWM Rules, 2016
- Treated wastewater not complying with standards prescribed under BMWM Rules, 2016
- Non-compliance to standards for autoclave/microwave prescribed under BMWM Rules, 2016
- Failure to timely collect biomedical waste from all the member healthcare facilities
- Any other violation(s) to the conditions under BMWM Rules, 2016 and CPCB guidelines

The Damage Cost will be levied using the formula below,

**DC**-II **for CBWTFs = $PI_{BM}$ x S x Rx N**

Where,
$PI_{BM}$– Pollution Index
$S_{BM}$ – Size of Operation
R – Rupees Factor
N – Duration Factor

**Table 35:** Pollution Index($PI_{BM}$) w.r.t types of violation

| **Pollution Index, PI is a number from 0 to 100 and increasing value of PI denotes the increasing degree of pollution hazard from CBWTF.** | |
|---|---|
| **Types of Violation** | **$PI_{BM}$** |
| Incinerator emissions not complying with standards notified under BMWM Rules, 2016 | 20 |
| Treated wastewater not complying with standards notified under BMWM Rules, 2016 | 15 |
| Not complying with standards of autoclave/microwave notified under BMWM Rules, 2016 | 15 |
| Biomedical waste not collected and disposed off within 48 hours | 10 |
| Each of Other violations to BMWM Rules, 2016 / CPCB Guidelines | 10* |

** Score of 10 can be added at* "Each of Other violations to BMWM Rules, 2016 / CPCB Guidelines", provided sum of PI is limited to 100.
**Summation limited to 100*

**Table 36:** Size of operation, $S_{BM}$ for CBWTFs

| **Size of operation, $S_{BM}$ for CBWTFs** | |
|---|---|
| **Authorized Treatment Capacity (Based on Incinerator size)** | **Scale Factor ($S_{BM}$)** |
| Up to 100 Kg/hour | 0.25 |
| 100 to 250 Kg/hour | 0.50 |
| 250 to 500 Kg/hour | 1.00 |
| > 500 Kg/hour | 1.50 |

**Note**

- In any case minimum DC amount for Common Biomedical Waste Treatment Facility shall not be less than Rs. 3,000/- per day.
- For Healthcare facilities having their own treatment and disposal facility, the DC shall be calculated as in the case of CBWTFs.

**Table 37:** Increase in Damage Cost amount in case of delay in deposition

| **Scenario** | **Applicable DC** |
|---|---|
| Up to 30 days from target date | Original DC |
| Between 30 to 60 days beyond target date | Two times |
| Fails to comply in 2nd inspection including new violations if any | Two times |
| Between 60 to 90 days beyond target date | Four times |
| Beyond 90 days | Closure of CBWTF |

| | |
|---|---|
| Fails to comply in 3rd consecutive inspection | Closure of CBWTF |

## 5. Non-compliance to Plastic Waste Management Rules

DC is to be levied for non-compliance of the following provisions of the PWM Rules,

**Table 38:** Provisions under PWM Rules and amendments thereafter

| Rule | Provisions |
|---|---|
| 4 (1) (c) | Carry bag made of virgin or recycled plastic, shall not be less than seventy five microns in thickness with effect from the 30th September, 2021 and one hundred and twenty (120) microns in thickness with effect from the 31st December, 2022 |
| 4(1) (d) | Plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except as specified by the Central Government where the thickness of such plastic sheets impair the functionality of the product |
| 4(1)(e ) | The manufacturer shall not sell or provide or arrange plastic to be used as raw material to a producer or to a seller not registered under these rules |
| 4 (1) (f) | Sachets using plastic material shall not be used for storing, packing or selling gutkha, tobacco and pan masala |
| 4(1) (h) | The provision of thickness under clause (c) shall not apply to carry bags or commodities made from compostable plastic or biodegradable plastics. Carry bags and commodities made from compostable plastics shall conform to the Indian Standard: IS/ISO 17088:2021 titled as Specifications for Compostable Plastics |
| 4(1) (i) | plastic material, in any form including Vinyl Acetate - Maleic Acid - Vinyl Chloride Copolymer, shall not be used in any package for packaging gutkha, pan masala and tobacco in all forms. |
| 4 (1) (j) | Non-woven plastic carry bag shall not be less than 60 Gram Per Square Meter (GSM) with effect from the 30th September, 2021 |
| 6(1) & (7) | Every local body/ Panchayat shall be responsible for development and setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste either on its own or by engaging agencies |
| 6(2)(g) & 7(c ) | Ensuring that open burning of plastic waste does not take place |
| 8(1)(a) | The waste generator shall take steps to minimize generation of plastic waste and segregate plastic waste at source in accordance with the Solid Waste Management Rules, 2000 or as amended from time to time |
| 8(1)(b) | The waste generator shall not litter the plastic waste and ensure segregated storage of waste at source and handover segregated waste to urban local body or gram panchayat or agencies appointed by them or registered waste pickers', registered recyclers or waste collection agencies |

| Rule | Provisions |
|---|---|
| 9(1) | The Producers, Importers and Brand Owners who introduce any plastic packaging in the market shall be responsible for collection of such plastic packaging. |
| 9(2) & 2 (A) | Where any Producer, Importer or Brand owner fulfils his extended producer responsibility, he is deemed to have complied with his responsibility under sub-rule (1).<br>2(A) The Producers, Importers, Brand Owners, manufacturers, and manufacturers of commodities made from compostable plastics or biodegradable plastics, shall fulfil Extended Producer Responsibility as per guidelines specified in Schedule- II |
| 13 (1) & 13(2) | (1) No person shall manufacture carry bags or recycle plastic bags or multilayered packaging unless the person has obtained a registration from<br>(i) the concerned State Pollution Control Board or the Pollution Control Committee of the Union Territory, if operating in one or two states or Union territories;<br>(ii) the Central Pollution Control Board if operating in more than two States or Union territories.<br><br>(2) Every producer or importer or brand-owner shall for the purpose of one –time registration make an application in Form I through the centralized online portal specified in Schedule-II , to –<br>(i) the State Pollution Control Board or the Pollution Control Committee of the Union territory concerned, if operating in one or two States or Union territories; or<br>(ii) the Central Pollution Control Board, if operating in more than two States or Union territories. |
| 13(3) | Every person recycling or processing waste or proposing to recycle or process plastic waste shall for the purpose of one-time registration make an application to the concerned State Pollution Control Board or the Pollution Control Committee in Form II through Centralized online portal specified in Schedule –II. |
| 13(4) | Every manufacturer and importer of plastic raw material shall make an application to the State Pollution Control Board or the Pollution Control Committee concerned, for registration, in the Form III. |
| 14(1) | Retailers or street vendors shall not sell or provide commodities to consumer in carry bags or plastic sheet or multilayered packaging, which are not manufactured and labelled or marked, as per prescribed under these rules |

DC shall be levied on case to case basis based on avoidance cost method,

The cost incurred on management of plastic waste management is divided into following components**,**

**Table 39:** Components w.r.t cost incurred on management of plastic waste management and Avoided cost

| S.No. | Component | Avoided cost |
|---|---|---|
| 1 | Collection & Transportation of Plastic waste | Rs. 2000/- per ton of waste |
| 2 | Setting up of Material Recovery Facility (MRF) | • 100 TPD plant - Rs. 7 crore<br>• 01 TPD plant - Rs.7 lakh<br>• Rs.150/- per ton of plastic waste (considering 15 year MRF plant life) |
| 3 | Setting up of RDF facility | • 100 TPD capacity - Rs. 12.5 Crore<br>• 1 TPD plant - Rs.12.5 lakh<br>• Rs.270/- per ton of plastic waste (considering 15 year RDF plant life) |
| 4 | O&M Cost of RDF facility | • Operational cost - Rs. 1200/- per ton of plastic waste<br>• Transportation cost - Rs. 300/- per ton of plastic waste |
| Note:<br>• Total cost avoided = Rs.4000/- per ton of plastic waste.<br>• A deterrent factor of 1.25 times is levied on avoided cost (1.25 X Rs. 4000/- per ton = Rs. 5000/- per ton)<br>• As per PWM Rules, the responsibility of plastic waste management & infrastructure development is entrusted on local bodies and plastic producers/ brand owners, accordingly the avoided cost is divided equally, i.e. Rs.2500/- per ton of plastic waste on each body | | |

Details of DC to be levied for non-compliance to PWM Rules is given below,

**Table 40:** Details of DC to be levied & punitive actions to be taken for non-compliance of PWM Rules

| **DETAILS OF DC TO BE LEVIED & PUNITIVE ACTIONS TO BE TAKEN FOR NON-COMPLIANCE OF PWM RULES** | | | | |
|---|---|---|---|---|
| **Rule** | **Provisions** | **Violator** | **Violation** | **Damage Cost & Actions** |
| 4(1)(c) and 4(1)(J) | Carry bag made of virgin or recycled plastic, shall not be less than seventy-five microns in thickness with effect from the 30th September,2021 and one hundred and | Producer | Manufacturing bags not meeting specifications | (i) Seizure of manufactured products & closure of unit<br>(ii) DC to be levied @ Rs.5000/-per ton of plastic bags manufactured from |

| | | | | |
|---|---|---|---|---|
| | twenty (120) microns in thickness with effect from the 31st December, 2022<br><br>(j) non-woven plastic carry bag shall not be less than 60 Gram Per Square Meter (GSM) | | | the date of inception of the unit or date of notification of PWM Rules (March 18, 2016) whichever is later<br>(DC to be levied @ Rs.10000/- per ton for 2nd violation and @ Rs.20000/- per ton for 3rd violation)<br>(iii) Penalty as per Section 15(1) of EPA 1986 |
| 4(1)(d) | Plastic sheet or like, which is not an integral part of multilayered packaging and cover made of plastic sheet used for packaging, wrapping the commodity shall not be less than fifty microns in thickness except as specified by the Central Government where the thickness of such plastic sheets impair the functionality of the product | Producer | Manufacturing sheets not meeting specifications | (i) Seizure of manufactured products & closure of Unit<br>(ii) DC to be levied @ Rs.5000/- per ton of plastic used in packaging of tobacco products from the date of inception of the unit or date of notification of PWM Rules (March 18, 2016) whichever is later<br>(DC to be levied @ Rs.10000/- per ton for 2nd violation and @ Rs.20000/- per ton for 3rd violation)<br>(iii) Penalty as per Section 15(1) of EPA 1986 |
| 4(1)(f) & 4(1)(i) | f) Sachets using plastic material shall not be used for storing, packing or selling gutkha, tobacco and pan masala<br>(i) plastic material, in any form including Vinyl Acetate - Maleic | Producer | Using plastic material for packaging | (i) Seizure of products &closure of Unit<br>(ii) DC to be levied @ Rs.5000/- per ton of plastic used in packaging of tobacco products from the date of inception of the unit or date of |

| | | | | |
|---|---|---|---|---|
| | Acid - Vinyl Chloride Copolymer, shall not be used in any package for packaging gutkha, pan masala and tobacco in all forms | | | notification of PWM Rules (March 18, 2016) whichever is later<br>(iii) Penalty as per Section 15(1) of EPA 1986<br>(DC to be levied @ Rs.10000/- per ton for 2nd violation and @ Rs.20000/- per ton for 3rd violation) |
| 4 (1)(h) | The manufacturers of compostable plastic or biodegradable plastic carry bags or commodities permitted under the rules, shall obtain a certificate from the Central Pollution Control Board before marketing or selling. | Manufacturer | Certificate Not Obtained | DC to be levied @ Rs.7900/- per ton of compostable and biodegradable plastic produced from the date of inception of the unit or date of notifications of PWM Rules (March 18, 2016 and July 06,2022 respectively) whichever is later |
| | | | Not complying with conditions specified in Certificate issued by CPCB | (i) Cancellation of CPCB Certificate<br>(*In case the violation is found w.r.t raw material used/ product manufactured, DC to be levied as per violation of Rule 13(2). Penalty for non-compliance of remaining condition shall be taken in accordance with relevant section of the PWM Rules)*<br>(ii) enalty as per Section 15(1) of EPA 1986 |
| 6(1) & (7) | Every local body/ Gram Panchayat shall be responsible for development and | Municipal Commissioner, Village | Adequate facilities for plastic waste | (i) DC to be levied @ Rs.5000/-per ton of plastic waste. DC to be levied for |

| | | | | |
|---|---|---|---|---|
| | setting up of infrastructure for segregation, collection, storage, transportation, processing and disposal of the plastic waste either on its own or by engaging agencies | Panchayat, | management(PWM) not provided | shortfall in the PW quantity for which PWM facilities have not been provided w.e.f March 18, 2016 date of notification of Rules<br>(DC to be levied @ Rs.10000/- per ton for 2nd violation and @ Rs.20000/- per ton for 3rd violation)<br>(ii) Penalty as per Section 15(1) of EPA 1986 |
| 6(2)(g) & 7(c ) | Ensuring that open burning of plastic waste does not take place | Person responsible for plastic burning Industries | Burning plastic | (i) Fine per incident of burning = Rs.5000/-<br>(ii) Fine per incident of bulk burning = Rs.25000/-<br><br>*Minimum DC to be levied for the said violation by the Local body is as above.*<br><br>*Local bodies already imposing fine may continue doing so, if the amount is more than minimum specified fine given above.*<br><br>(iii) Penalty as per Section 15(1) of EPA 1986 |
| 8(1)(a) | The waste generator shall take steps to minimize generation of plastic waste and segregate plastic waste at source in accordance with the Solid Waste Management Rules, | Waste generator | Waste not segregated | (i) Waste generator: Spot fine - Rs. 500/- (I violation); Rs.1000/- (II violation); Rs. 2,000/- (III violation &thereafter)<br>*(ii)* Institutional Waste Generator: Spot fine |

| | | | | |
|---|---|---|---|---|
| | 2000 or as amended from time to time. | | | Rs.5000/- (I violation); Rs. 10,000/- (II violation); Rs. 20,000/- (III violation & thereafter)<br><br>*Above is minimum DC to be levied for the said violation by the Local body.*<br><br>*Local bodies already imposing fine may continue doing so, if the amount is more than minimum specified fine given above.*<br><br>(iii)Penalty as per Section 15(1) of EPA 1986 |
| 8(1)(b) | The waste generator shall not litter the plastic waste and ensure segregated storage of waste at source and handover segregated waste to urban local body or gram panchayat or agencies appointed by them or registered waste pickers', registered recyclers or waste collection agencies | Waste generator | Waste littered | (i) Waste generator: Spot fine - Rs. 500/- (I violation); Rs. 1000/- (II violation); Rs. 2,000/- (III violation & thereafter)<br><br>*(ii)* Institutional Waste Generator: Spot fine Rs.5000/- (I violation); Rs. 10,000/- (II violation); Rs. 20,000/- (III violation & thereafter)<br><br>*Above is minimum DC to be levied for the said violation by the Local body.*<br><br>*Local bodies already imposing fine may continue doing so, if* |

| | | | | |
|---|---|---|---|---|
| | | | | *the amount is more than minimum specified fine given above.*<br><br>(iii)Action as per Section 15(1) of EP Act for violation thereafter |
| 13 (2) | Every producer or importer or brand-owner shall for the purpose of one –time registration make an application in Form I through the centralized online portal specified in Schedule-II , to -<br>(i) The State Pollution Control Board or the Pollution Control Committee of the Union territory concerned, if operating in one or two States or Union territories; or<br>(ii) the Central Pollution Control Board, if operating in more than two States or Union territories. | Producer & importers and Brand Owner | Registration not obtained | (i) Closure of operations of the brand owner<br>(ii) DC to be levied @ Rs.5000/- per ton of plastic waste introduced by the producer or importer or the brand owner from the date of inception of the unit or date of notification of PWM Rules (March 18, 2016) whichever is later<br>(DC to be levied @ Rs. 10,000/- per ton for 2nd violation and @ Rs. 20,000/- per ton for 3rd violation)<br>(iii) Penalty as per Section 15(1) of EPA 1986 |
| | | | Non-compliance of conditions stipulated in the Registration | (i) Cancellation of Registration |

| | | | | |
|---|---|---|---|---|
| | | | Not meeting set PWM target as per the Registration certificate | (ii) DC to be levied @ Rs.5000/- per ton of PW introduced by the producer or brand owner for which EPR liability has not been fulfilled for the period under consideration (DC to be levied @ Rs.10,000/- per ton for II violation and @ Rs.20,000/- per ton for III violation) |
| 13(4) & 4 (1) (e) | 13 (4) Every manufacturer and importer of plastic raw material shall make an application to the State Pollution Control Board or the Pollution Control Committee concerned, for registration, in the Form III | Manufacturer | Unit operating without registration | (i) Closure of unit<br>(ii) DC to be levied @ Rs.2500/- per ton of plastic raw material manufactured from the date of inception of the unit or date of notification of PWM Rules (March 18, 2016) whichever is later<br>(DC to be levied @ Rs.5000/- per ton for II violation and @ Rs.10000/- per ton for III violation thereafter)<br>(iii) Penalty as per Section 15(1) of EPA 1986 |
| | 4(1)(e) the manufacturer shall not sell or provide or arrange plastic to be used as raw material to a producer or to a seller not registered under these rules | Manufacturer | Raw material sold to producers not having registration from SPCB | (i) DC to be levied @ Rs.2500/- per ton of plastic raw material sold to unregistered producers from the date of notification of PWM Rules (March 18, 2016) whichever is later (DC to be levied @ Rs.5,000/- per ton for II violation and @ Rs.10,000/- per ton for III |

| | | | | |
|---|---|---|---|---|
| | | | | violation & closure of unit thereafter) |
| 14(1) | Retailers or street vendors shall not sell or provide commodities to consumer in carry bags or plastic sheet or multilayered packaging, which are not manufactured and labelled or marked, as per prescribed under these rules. | Stockist/ Distributors | Stocking and distribution of prohibited SUP items or Selling products in plastic bags which are not complying with provisions of PWM Rules | Seizure of plastic bags/sheets; Cancellation of Commercial licence by concerned Local Authority. Fine Rs.2000/- (I violation); Rs.5000/- (II violation); Rs.10,000/- (III violation<br><br>*Above is minimum DC to be levied for the said violation by the Local body.*<br><br>*Local bodies already imposing fine may continue doing so, if the amount is more than minimum specified fine given above.*<br><br>Penalty as per Section 15(1) of EPA 1986 |

The minimum and maximum value of DC to be levied for violation of specific provisions of Rules is given below,

The DC shall be deposited by the violating facility within the stipulated time period specified under directions issued by CPCB/SPCB/PCC. In case, such facility does not submit the same within the stipulated time frame the amount will be increased as below,

**Table 41:** DC Charges and Financial Penalty w.r.t. delay in DC deposition

| S. No. | Amount Deposition time period | Damage Cost and Penalty Amount |
|---|---|---|
| 1. | Within one month from the stipulated time period as directed by CPCB/SPCB/PCC | Original amount with interest @ 12% per annum for number of days delayed after the stipulated date of amount deposition |
| 2. | After one month but within 03 months after the stipulated time period as directed by CPCB/SPCB/PCC | Original amount with interest @ 24% per annum for number of days delayed after one month of the stipulated date of amount deposition |
| 3. | After 03 months | a) Closure of unit/facility<br>b) Seizure of trade documents<br>c) Action as per Section 15 (1) of EPA<br>*Action, as applicable, to be taken by Local bodies for Clause 8(1)(a), 8(1)(b) and 14(1) and for the remaining clauses action has to be taken by the concerned SPCB/ PCC/ CPCB* |

## 6. Discharge of Untreated treated Sewage by individual/authority

The calculation of Damage Cost in case of discharge of untreated or partially treated Sewage by concerned body is based on avoided cost method. It is determined using capital cost, O & M cost and environmental externality cost, as specified in the following formula,

**DC-II = Capital Cost Factor [Marginal Average Capital Cost for Treatment Facility x (Total Sewage Generation - Installed Treatment Capacity) + Marginal Average Capital Cost for Conveyance Facility x (Total Sewage Generation - Operational Capacity)] + O&M Cost Factor x Marginal Average O&M Cost x (Total Sewage Generation - Operational Capacity) x No. of days for which facility was unavailable + Environmental Externality x No. of Days for which facility was not available**

The formula can be condensed as below,

**DC-II (Lacs Rs.) = 17.5 (Total Sewage Generation – Installed Treatment Capacity) + 55.5 (Total Sewage Generation - Operational Capacity) + 0.2 (Sewage Generation - Operational Capacity) x N + Marginal Cost of Environmental Externality x (Total Sewage Generation - Operational Capacity) x N**

Where,
N= Duration Factor and All quantities in Million Litres per Day (MLD)

**Table 42:** Sample Calculations for DC for untreated treated sewage

| City | Delhi | Agra | Gurugram | Ambala |
|---|---|---|---|---|
| Population (2011) | 1,63,49,831 | 17,60,285 | 8,76,969 | 5,00,774 |
| Class | Mega-City | Million-plus City | Class-I Town | Class-I Town |
| Sewage Generation (MLD) (*as per the latest data available with CPCB)* | 4195 | 381 | 486 | 37 |
| Installed Treatment Capacity (MLD) (as per the latest data available with CPCB) | 2500 | 220 | 404 | 45.5 |
| Operational Capacity (MLD) (as per the latest data available with CPCB) | 1900 | 140 | 300 | 24.5 |
| Treatment Capacity Gap (MLD) | 2295 | 241 | 186 | 12.5 |
| Calculated DC (capital cost component for STPs) in Lacs Rs. | 29662.50 | 2817.50 | 1435.00 | 0.00 |
| Calculated DC (capital cost component for Conveyance System) in Lacs. Rs. | 127372.50 | 13375.50 | 10323.00 | 693.75 |
| Calculated DC (Total capital cost component) in Lacs Rs. | 157035.00 | 16193.00 | 11758.00 | 693.75 |
| Minimum and Maximum values of DC (Total Capital Cost Component) (Lacs Rs.) | Min. 2000 Max. 20000 | Min. 1000 Max. 10000 | Min. 100 Max. 1000 | Min. 100 Max. 1000 |
| Final DC (Total Capital Cost Component) in Lacs Rs. | **20000.00** | **10000.00** | **1000.00** | **693.75** |
| Calculated DC (O&M Component in Lacs Rs./day | 459.00 | 48.20 | 37.20 | 2.50 |
| Minimum and Maximum values of DC (O&M Cost Component) recommended by the Committee (Lacs Rs./day) | Min. 2 Max. 20 | Min. 1 Max. 10 | Min. 0.5 Max. 5 | Min. 0.5 Max. 5 |
| Final DC (O&M Component) in Lacs. Rs./Day | **20.00** | **10.00** | **5.00** | **2.50** |
| Calculated Environmental Externality (Lacs Rs .Per Day) | 2.0655 | 0.2049 | 0.1395 | 0.0094 |
| Minimum and Maximum value of Environmental Externality recommended by | Min. 0.60 Max. 0.80 | Min. 0.25 Max. 0.35 | Min. 0.05 Max. 0.10 | Min. 0.05 Max. 0.10 |

| | | | | |
|---|---|---|---|---|
| the Committee (Lacs Rs. Per Day) | | | | |
| Final Environmental Externality (Lacs Rs. Per day) | **0.80** | **0.25** | **0.10** | **0.05** |

To enhance the deterrent effect for continuous violations, the components of O&M and Environmental Externality in the DC formula may be exponentially increased by 2, 4, and 8 times every six months, beyond the duration specified by the authority to ensure the complete treatment of sewage/waste in the city/town.

## 7. Non-Compliance to Solid Waste Management Rules

### (i) Unavailable or inadequate Treatment and Processing System

The avoided cost methods are applicable when there is a lack of provision or inadequate facility for solid waste treatment and processing. The Damage Cost can be levied on Urban Local Bodies (ULB) can be calculated using following formula:

**DC-II = Capital Cost Factor x Marginal Average Cost for Waste Management x (Per day waste generation - Per day waste disposed as per the Rules) + O&M Cost Factor x Marginal Average O&M Cost x (Per day waste generation - Per day waste disposed as per the Rules) x Number of days violation took place + Environmental Externality x N**

Where,
N= Duration Factor
Waste Quantity is in tonnes per day (TPD)

Simplifying,

**DC-II (Lacs Rs.) = 2.4 (Waste Generation - Waste Disposed as per the Rules) + 0.02 (Waste Generation - Waste Disposed as per the Rules) x N + Marginal Cost of Environmental Externality x (Waste Generation - Waste Disposed as per the Rules) x N**

**Table 43:** Sample Calculations for DC for improper solid waste management

| **City** | **Delhi** | **Agra** | **Gurugram** | **Ambala** |
|---|---|---|---|---|
| Population (2011) | 1,63,49,831 | 17,60,285 | 8,76,969 | 5,00,774 |
| Class | Mega-City | Million-plus City | Class-I Town | Class-I Town |
| Waste Generation (kg. per person per day) | 0.6 | 0.5 | 0.4 | 0.4 |
| Waste Generation (TPD) | 9,809.90 | 880.14 | 350.79 | 200.31 |
| Waste Disposal as per Rules (TPD) (*assumed as 25% of waste generation for sample calculation)* | 2,452.47 | 220.04 | 87.70 | 50.08 |
| Waste Management Capacity Gap (TPD) | 7,357.42 | 660.11 | 263.09 | 150.23 |
| Calculated DC (capital cost component) in Lacs. Rs. | 17,657.82 | 1,584.26 | 631.42 | 360.56 |
| Minimum and Maximum values of DC (Capital Cost Component) in Lacs Rs. | Min. 1000 Max. 10000 | Min. 500 Max. 5000 | Min. 100 Max. 1000 | Min. 100 Max. 1000 |
| Final DC (capital cost component) in Lacs. Rs. | **10,000.00** | **1,584.26** | **631.42** | **360.56** |
| Calculated DC (O&M Component) in Lacs. Rs./Day | 147.15 | 13.20 | 5.26 | 3.00 |
| Minimum and Maximum values of DC (O&M Cost Component) in Lacs Rs./Day | Min. 1.0 Max. 10.0 | Min. 0.5 Max. 5.0 | Min. 0.1 Max. 1.0 | Min. 0.1 Max. 1.0 |
| Final DC (O&M Component) in Lacs. Rs./Day | **10.00** | **5.00** | **1.00** | **1.00** |
| Calculated Environmental Externality (Lacs Rs. Per Day) | 2.58 | 0.18 | 0.03 | 0.02 |
| Minimum and Maximum value of Environmental Externality (Lacs Rs. per day) | Max. 0.80 | Min. 0.25 Max. 0.35 | Min. 0.01 Max. 0.05 | Min. 0.01 Max. 0.05 |
| Final Environmental Externality (Lacs Rs. per day) | **0.80** | **0.25** | **0.03** | **0.02** |

## 8. Non-compliance to Electronic Waste Management Rules

DC is to be levied for the non-compliance of the following provisions of the E-Waste (Management) Rules, 2022 and amendments thereafter as listed in **Table 44.**

| Rules | Provisions |
|---|---|
| 4(2) | In case any entity falls in more than one category under sub-rule 4 (1), then the entity shall register under those categories separately. |
| 4(3) | No entity referred in sub-rule 4 (1) shall carry out any business without registration. |
| 4(4) | The entities registered under sub-rule 4 (1) shall not deal with any unregistered manufacturer, producer, recycler and refurbisher. |
| 4(5) | Where any registered entity furnishes false information or wilfully conceals information for registration or for filing returns or report required to be provided under these rules or in case of any irregularity |
| 4(5) | Where any registered entity furnishes false information or wilfully conceals information for getting registration or return or report or information required to be provided or furnished under these rules or in case of any irregularity |
| 5(3), 6(4), 7(4), 9(6), 12(2)(iii) | File annual and quarterly returns in the laid down form on the portal on or before the end of the month succeeding the quarter or year, as the case may be, to which the return relates; |
| 6(2) | Provided that the producers having EPR plan under the provisions of the erstwhile E-Waste (Management) Rules, 2016 shall migrate under these rules as per the procedures laid down by CPCB with approval of Steering Committee. |
| 7(2) | Collect e-waste generated during the process of refurbishing and hand over the waste to registered recycler and upload information on the portal |
| 7(3) | Ensure that the refurbished equipment shall be as per Compulsory Registration Scheme of the Ministry of Electronics and Information Technology and Standards of Bureau of Indian Standards framed for this purpose; |
| 9(2) | Ensure that the facility and recycling processes are in accordance with the standards with the standards or guidelines laid down by Central Pollution Control Board in this regards from time to time. |
| 9(3), 9(4) | All recycler shall have to,<br>(3) ensure that the fractions or material not recycled in its facility is sent to the respective registered recyclers;<br>(4) ensure that residue generated during recycling process is disposed of in an authorized treatment disposal facility. |
| 9(5) | Maintain record of e-waste collected, dismantled, recycled and sent to registered recycler on the portal and make available all records for verification or audit as and when required. |
| 11 | Procedure for storage of e-waste. - Every manufacturer, producer, |

| Rules | Provisions |
|---|---|
| | refurbisher and recycler may store the e-waste for a period not exceeding one hundred and eighty days and shall maintain a record of sale, transfer and storage of e-wastes and make these records available for inspection and the storage of the e-waste shall be done as per the applicable rules or guidelines for the time being in force: Provided that the Central Pollution Control Board may extend the said period up to three hundred and sixty-five days in case the e-waste needs to be specifically stored for development of a process for its recycling or reuse. |
| 11 | Procedure for storage of e-waste. - Every manufacturer, producer, refurbisher and recycler may store the e-waste for a period not exceeding one hundred and eighty days and shall maintain a record of sale, transfer and storage of e-wastes and make these records available for inspection and the storage of the e-waste shall be done as per the applicable rules or guidelines for the time being in force: |
| 16(1),16(2), 16(4),16(5), 16(7),16(8) | (1)Every producer of electrical and electronic equipment and their components or consumables or parts or spares listed in Schedule-I shall ensure that, new electrical and electronic equipment and their components or consumables or parts or spares do not contain Lead, Mercury, Cadmium, Hexavalent Chromium, polybrominated biphenyls and polybrominated diphenyl ethers beyond a maximum concentration value of 0.1 per cent by weight in homogenous materials for lead, mercury, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers and of 0.01 per cent by weight in homogenous materials for cadmium.<br>(2) Components or consumables or parts or spares required for the electrical and electronic equipment placed in the market prior to the 1st May, 2014 may be exempted from the provisions.<br>(4) Every producer of applications listed in Schedule-II shall ensure that the limits of hazardous substances as given in Schedule-II are to be complied.<br>(5) Every producer shall provide the detailed information on the constituents of the equipment and their components or consumables or parts or spares along with a declaration of conformance to the reduction of hazardous substances provisions in the product user documentation.<br>(7) Manufacture and supply of electrical and electronic equipment used for defence and other similar strategic applications shall be excluded from provisions of sub- rule (1).<br>(8) Every producer shall provide information on the compliance of the provisions of sub-rule (1) and this information shall be in terms of self-declaration |

| Rules | Provisions |
|---|---|
| 22(2) | The Central Pollution Control Board shall also lay down guidelines for imposition and collection of environmental compensation on the producer in case of non-fulfilment of obligations set out in these rules and transaction or use of false extended producer responsibility certificate and the said guidelines shall be in accordance with these rules and shall be approved by the Ministry of Environment, Forest and Climate Change. |
| 22(2) | The Central Pollution Control Board shall also lay down guidelines for imposition and collection of environmental compensation on the producer in case of non-fulfilment of obligations set out in these rules and transaction or use of false extended producer responsibility certificate and the said guidelines shall be in accordance with these rules and shall be approved by the Ministry of Environment, Forest and Climate Change. |
| 22(5) | False information resulting in over generation of extended producer responsibility certificates by recycler shall result in revocation of registration and imposition of environmental compensation which shall not be returnable and repeat offence, violation of these rules for three times or more shall also result in permanent revocation of registration over and above the environmental compensation charges. |
| SOPs of Registration as on E-Waste EPR Portal | The validity of registration will be of five (05) Years from the date of grant of Registration |
| E-Waste (Management), Rules, 2022 | - |

DC is divided into two regimes, DC Regime 1 and DC Regime 2 based on the non-fulfilment of EPR target by the Producers and other non-compliances of E-Waste (Management) Rules, 2022 and amendments thereof by Producers / Manufacturers / Recyclers / Refurbishers.

In DC Regime 1, producers are covered for not meeting their end product wise targets. Short fall in end product wise target has been considered as adverse impact and damage to the environment and this adverse impact and damage to the environment has happened because quantity of E-Waste equivalent to shortfall in target was not collected, transported to recycling facility and recycled in an environmentally sound manner. So, producers have to bear the average cost of collection, transportation and processing as a compensation for damaging the environment. So in DC Regime 1, average cost of collection, transportation of E- Waste and processing cost to recover end product metals are taken as parameters for deciding the DC.

In DC Regime 2, average application fees as applicable for registration of Recyclers / Manufacturers / Refurbishers on the E-Waste EPR Portal is Rs. 15,000/- and under these rules is considered as the parameter in this regime. For Producers, the applicable registration fee varies from Rs. 2,500/- to Rs. 15,00,000/- due to wide variation in volume of sales, a value of Rs. 20,000/- has been considered as a base DC charges, in DC Regime 2

**Boundary Condition for Damage Cost of EPR Certificate**:

i. The lowest price for exchange of extended producer responsibility (EPR) certificates for end products metal namely Gold (Au), Copper (Cu), Aluminium (Al) and Iron (Fe) should not be higher than the market value of these metals. This ensures that metals are recovered from the recycling of E-Waste rather than purchasing metals from the market and selling them to generate EPR certificates.

ii. The Damage Cost shall not absolve the producers from their extended producer responsibility

**Approach for Determination of Damage Cost**

**DC Regime 1** – In this regime, DC will be levied to the Producers for non-fulfilment of EPR target end product wise.
**DC Regime 2** – In this regime, DC will be levied to any entity for non-compliances of E-Waste (M) Rules, 2022 and amendments thereof

**DC Regime 1**

The DC to producers for not meeting the EPR Targets end products wise is the average expense on e-waste collection, transportation and recycling of e waste.

The concept for arriving DC charges as per the above scenario is given below:

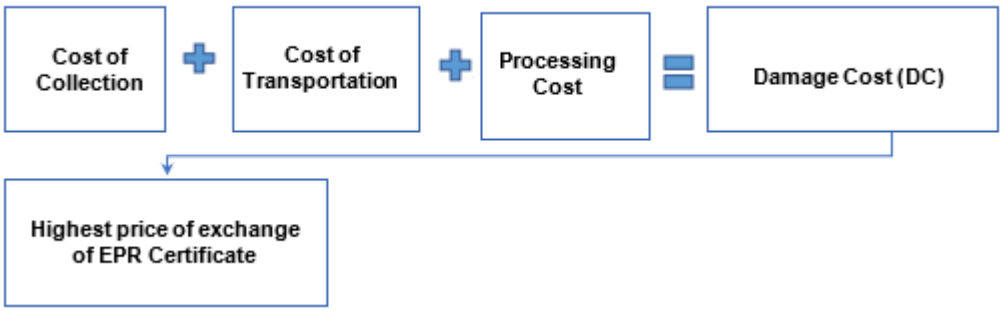


***Figure 4:*** *Concept of DC Regime 1*

The cost components for DC calculation is given below:

i. Cost of Collection and Transportation of E-Waste = Rs. 25 per kg of E-Waste
ii. Processing cost to recover end products is summarized in table below:

**Table 45:** Processing Cost End Product wise

| **PROCESSING COST End Product wise*** | | | |
|---|---|---|---|
| **Gold(Au)** | **Copper(Cu)** | **Iron (Fe)** | **Aluminum (Al)** |
| Rs. per gm | Rs. per kg | | |
| 2550 | 1850 | 76 | 431 |

***** Source: Based on information from Recycler's Associations (MRAI and REIA)

Assuming that the E-waste contains equal quantity of all four end products the (i) Cost of Collection and Transportation for each of the end products will be Rs. 25. Hence, the end product wise DC is calculated by adding the cost of collection and transportation for each end product and processing of cost of each end product.
The Damage Cost for each end product is given below in the Table 46.

**Table 46:** Damage Cost in Rupees- End Product Wise

| **Element** | **Gold(Au) (Rs/gm)** | **Copper(Cu) (Rs/Kg)** | **Iron (Fe) (Rs/Kg)** | **Aluminum (Al) (Rs/Kg)** |
|---|---|---|---|---|
| DC | 2575 | 1875 | 101 | 456 |

The lowest price of exchange of Extended Producer Responsibility (EPR) Certificate Cost is given in the Table 47.

**Table 47:** lowest price of exchange of Extended Producer Responsibility (EPR) Certificate Cost

| **Au (Rs/gm)** | **Cu (Rs/kg)** | **Fe (Rs/kg)** | **Al (Rs/kg)** |
|---|---|---|---|
| 772 | 562 | 30 | 136 |

**DC in terms of EEE items category**

In the E-Waste EPR regime, it has been observed that producers are giving purchase orders for procurement of EPR Certificate in term of EEE item codes. Since highest and lowest price of exchange of EPR certificate is linked with DC, DC in terms of category of EEE item has also been calculated. The calculation of DC in terms EEE category has been done using DC value of end products and average percentage composition of end products in that EEE category.

The DC in term of EEE item category and the corresponding lowes price of exchange of EPR Certificate is given below.

**Table 48:** DC in term of EEE item category and the corresponding lowest price of exchange of EPR Certificate

| S.No. | Categories of electrical and electronic equipment | EEE Items Category | DC in terms of EEE item category |
|---|---|---|---|
| (i) | Information technology and telecommunication equipment: | ITEW | 112 |
| (ii) | Consumer Electrical and Electronics and Photovoltaic Panels | CEEW | 74 |
| (iii) | Large and Small Electrical and Electronic Equipment | LSEEW | 76 |
| (iv) | Electrical and Electronic Tools (With the exception of large- Scale Stationary Industrial Tools) | EETW | 82 |
| (v) | Toys, Leisure and Sports Equipment | TLSEW | 34 |
| (vi) | Medical Devices (With the Exception of All Implanted and Infected Products) | MDW | 135 |
| (vii) | Laboratory Instruments | LIW | 136 |

**DC Regime 2: DC based on Registration Fee**

A. **DC Regime 2** will be applicable to the entities for violations under provisions of E-Waste (M) Rules, 2022 and amendments thereof except EPR obligation violation by producers. Under the DC Regime 2, the basis for calculation of DC shall be registration fee.

i. **For Producers** the registration fee for registration on the EPR Portal is based on the quantum of recycling targets and varies from Rs. 2500 to Rs. 15,00,000 In view of this variation and in order to have uniform penalty for similar violation by producers Rs. 20,000 has been taken as the fee for levying Damage Cost to Producers. The DC to Producers are as below:

For 1st Default – Rs. 20,000.
For 2nd Default – Two times of first default i.e. Rs. 20,000 x 2 = Rs. 40,000.
For 3rd Default – Two times of second default i.e. Rs. 40,000 x 2 = Rs. 80,000.

ii. For providing false sales data resulting in EPR obligation less than the actual EPR obligation then DC = Rs. 20,000 + quantity of false sales data x Rs 93 per Kg of false sales data **

** - Average DC in terms of EEE item category

**iii. For Recyclers, Refurbishers and Manufacturers** the registration fee on the EPR Portal is Rs. 15000. The DC to Recyclers, Refurbishers and Manufacturers are as below

For 1st Default – Rs. 15,000.
For 2nd Default – Two times of first default i.e. Rs. 15,000 x 2 = Rs. 30,000.
For 3rd Default – Two times of second default i.e. Rs. 30,000 x 2 = Rs. 60,000.

B. For Informal/illegal Sale/Storage/Transportation/ Dismantling/ Recycling/Processing of E-Waste by any non-registered entity/ person/shop/entity, **DC Regime 2** will be applicable and the DC will be as below:

DC = Rs. 15,000 + Quantity of E-Waste Seized x Rs 93 per Kg of seized E-Waste**

** - Average DC in terms of EEE item category

C. Submission of false information resulting in over generation of EPR certificates /refurbishing certificate, **DC Regime 2** will be applicable and the DC will be as below:

DC = Rs. 15,000 + Quantity of false EPR/ Refurbishing certificate generated x Rs 93 per Kg of false EPR/ Refurbishing certificate generated**

** - Average DC in terms of EEE item category

## Details of DC to be levied & Penal action for non-compliance

Details of Damage Cost to be levied and the penal action to be taken for non-compliance of E-Waste (Management) Rules, 2022 and amendments thereof, along with the nature of violation and the violator (concerned person/organization), is given in the table below:

**Table 49:** Producers and Manufacturers

| S.No. | Violation | DC |
|---|---|---|
| | **Registration on E-waste Portal** | |
| 1 | Operating without Registration | i. DC Regime 2 as below:<br>a) 1st default regime till 15 days.<br>b) 2nd default regime from 16th day till 30th Day and<br>c) 3rd default regime from 31st day till grant of registration<br>ii. The applicant has to register on the E-waste EPR Portal and the DC will be levied.<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 2 | Operating without valid registration- Failure in migration from the erstwhile E-Waste (Management) Rules, 2016 to E-Waste (Management) Rules, 2022- **For Producers** | i. DC Regime 2 as below:<br>a) 1st default regime till 15 days.<br>b) 2nd default regime from 16th day till 30th Day and<br>c) 3rd default regime from 31st day till grant of registration<br>ii. The applicant has to register on the E-waste EPR Portal.<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 3 | Operating without valid registration- Failure in renewal of Registration in time as prescribed under the rules. -**For Producers** | i. DC Regime 2 as below:<br>a) 1st default regime till 15 days.<br>b) 2nd default regime from 16th day till 30th Day and<br>c) 3rd default regime from 31st day till grant of registration<br>ii. The applicant has to register on the E-waste EPR Portal.<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 4 | Entity dealing with | DC Regime 2 |

| S.No. | Violation | DC |
|---|---|---|
| | unregistered entities | |
| | **Submission of false information or wilfully concealing information** | |
| 5 | Submission of wrong sales data or manufacturing data and/or wilful concealment of information on actual sales /manufacturing of EEE and components/spare/consumables etc. | i. DC Regime 2 - [A (i) + A (ii)]<br>ii. Beyond third default cancellation of registration issued by CPCB up to three years as decided by the Competent Authority CPCB.<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 6 | Submission of false information and/or wilful concealment of information | i. DC Regime 2<br>ii. Beyond third default cancellation of registration issued by CPCB up to three years as decided by the Competent Authority CPCB.<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| | **Non-fulfilment of obligations (for Producers only)** | |
| 7 | In case of non-fulfilment of EPR obligations set out in these rules | DC Regime 2 |
| | **EPR Certificates (for Producers only)** | |
| 8 | Transaction or use of false extended producer responsibility certificate or any unethical practice for transaction of certificate | i. DC Regime 2 and suspension of registration issued by CPCB for a period of minimum six months up to three years as decided by the competent Authority CPCB. |
| | **Annual and Quarterly returns Filings** | |
| 9 | Failure in filing the annual and quarterly return | i. Notice will be issued for **10** days after the last date of return filings.<br>ii. Thereafter Respective DC Regime 2 as below: |

| S.No. | Violation | DC |
|---|---|---|
| | | iii. 1st default regime if filed within **15** days after the last day of return filing<br>iv. 2nd default regime if filed within **30** days after the last day of return filing<br>v. 3rd default regime if filed within **60** days after the last day of return filing<br>Thereafter AR to be auto filled on the EPR Portal and DC will be levied on shortfall in recycling target if any, in addition to DC charges calculated above in points 9(iii) to 9(v).<br>If due to force majeure conditions, if the Producers /Manufactures are not able to file the returns, within the period of 60 days after the last day of filing, then the final decision regarding levying of DC will be taken by CPCB for the purpose. |
| | **Storage of E-Waste** | |
| 10 | Storing E-Waste beyond the prescribed time limit. | DC Regime 2 |
| 11 | Storing e-waste in an open area or non-designated area | |
| | Not having designated area for storage of e-waste in the premises | |
| | **ROHS Compliance** | |
| 12 | Non-compliance to ROHS provisions | DC Regime 2 |
| | **Audit** | |
| 13 | Non Compliance Found in Audit | DC Regime 2 and action as per Environment (Protection) Act, 1986 and Penalty as per Section 15 of Environment (Protection) Act 1986 |
| | **Non-disposal of E-Waste in environmentally sound manner** | |
| 14 | Not maintaining record of e-waste | DC Regime 2 |
| 15 | Non-disposal of e-waste generated during the | |

| S.No. | Violation | DC |
|---|---|---|
| | manufacturing of EEE | |
| | **Any other violation** | |
| 16 | Any other violation and not listed above | DC Regime 2 |

**Table 50:** Recyclers and Refurbishers

| S.No. | Violation | DC |
|---|---|---|
| | **Registration on E-waste portal** | |
| 1 | Operating without registration | i. DC Regime 2 as below:<br>a) 1st default regime till 15 days.<br>b) 2nd default regime from 16th day till 30th day and<br>c) 3rd default regime from 31st day till grant of registration<br>ii. The applicant has to register on the E-waste EPR Portal and the DC will be levied.<br>iii. For continued violation, (increase in DC amount, Closure of unit/ Cancellation of CTO and Authorization under Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016 etc.,) as deemed necessary by the Competent Authority, CPCB.<br>iv. Action as per Environment (Protection) Act, 1986<br>v. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 2 | Operating without valid registration- Failure in renewal of authorization in time as prescribed under the rules. | i. DC Regime 2 as below:<br>a) 1st default regime till 15 days.<br>b) 2nd default regime from 16th day till 30th day and<br>c) 3rd default regime from 31st day till grant of registration<br>ii. The applicant has to register on the E-waste EPR Portal and the DC will be levied. |

| S.No. | Violation | DC |
|---|---|---|
| | | iii. For continued violation, (increase in DC amount, Closure of unit/ Cancellation of CTO and Authorization under Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016 etc.,) as deemed necessary by the Competent Authority, CPCB<br>iv. Action as per Environment (Protection) Act, 1986<br>v. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| 3 | Entity dealing with unregistered entities | i. DC Regime 2<br>ii. The applicant has to register on the E-waste EPR Portal and the DC will be levied<br>iii. For continued violation, (increase in DC amount, Closure of unit/ Cancellation of CTO and Authorization under Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016 etc,) as deemed necessary by the Competent Authority, CPCB<br>iv. Action as per Environment (Protection) Act ,1986<br>v. Penalty as per Section 15 of Environment (Protection) Act ,1986 |
| | **Submission of false information or wilfully concealing information** | |
| 4 | Submission of false information or wilfully concealing information | DC Regime 2 |
| | **Annual and quarterly returns Filings** | |
| 5 | Failure in filing the annual and quarterly returns | i. Notice will be issued for **10** days after the last date of return filings.<br>ii. Thereafter Respective DC Regime 2 as below:<br>iii. 1st default regime if filed within **15** |

| S.No. | Violation | DC |
|---|---|---|
| | | days after the last day of return filing<br>iv. 2nd default regime if filed within **30** days after the last day of return filing<br>v. 3rd default regime if filed within **60** days after the last day of return filing<br>Thereafter AR to be auto filled on the EPR Portal, in addition to DC charges calculated above in points 5(ii) to 5(v).<br>vi. If due to force majeure conditions, if the recyclers/refurbishers are not able to file the returns, within the period of 60 days after the last day of filing, then the final decision regarding levying of DC will be taken by CPCB for the purpose. |
| | **Storage of E-Waste** | |
| 6 | Storing E-waste beyond the prescribed time limit. | DC Regime 2 |
| 7 | Storing e-waste in an open area or non-designated area | |
| | **EPR Certificates / Refurbishing Certificates** | |
| 8 | Transaction or use of false extended producer responsibility certificate/refurbishing certificates | i.DC Regime 2 - [A(iii) + C] and Suspension of registration issued by CPCB for a period of six months to three years as decided by the Competent Authority CPCB |
| 9 | Submission of False information resulting in over generation of EPR certificates /refurbishing | |
| | **Improper Recycling of E-Waste** | |
| 10 | Not sending fractions/ material not recycled in its facility to respective registered recyclers of e-waste/ Not sending parts/spare e-waste generated during refurbishing | DC Regime 2 |

| S.No. | Violation | DC |
|---|---|---|
| | **Record and Documentation** | |
| 11 | Maintain record and documentation and make available all records for verification or audit as and when required | DC Regime 2. |
| | **CPCB Guidelines** | |
| 12 | Non Compliance with CPCB guidelines | DC Regime 2. |
| | **Audit** | |
| 13 | Non Compliance Found in Audit | i. DC Regime 2<br>ii. For continued violation, (increase in DC amount, Closure of unit/ Cancellation of CTO and Authorization under Hazardous and other Wastes (Management & Transboundary Movement) Rules, 2016 etc.,) as deemed necessary by the Competent Authority, CPCB<br>iii. Action as per Environment (Protection) Act, 1986<br>iv. Penalty as per Section 15 of Environment (Protection) Act 1986 |
| | **Any Other Violation** | |
| 14 | Any other violation and not listed above | DC Regime 2 |

**Table 51:** Informal Activities/handling of E-Waste

| S. No. | Violation | DC |
|---|---|---|
| 1 | Informal/illegal Sale/Storage/Transportation/ Dismantling/ Recycling/Processing of E-Waste by any person/shop/entity | DC Regime 2 -[B] i.e. Rs. 15,000 + Quantity of E-Waste Seized x Rs 93 per Kg of seized E-Waste**<br>** -Average DC in terms of EEE item category |

**Note:**

a) *The Damage Cost shall be effective from the date of issue of this Damage Cost (DC).*
b) *As per the rules 22 (5) of the E-Waste (Management) Rules, 2022 and amendments thereof, false generation of EPR certificates by recyclers, for three times or more shall result in permanent revocation of their registration over and above the environmental compensation charges.*
c) *The Environment Compensation shall not absolve the producers from their extended producer responsibility and the unfulfilled extended producer responsibility for a particular year shall be carried forward to the next year and so on up to three years as per the sub rule 22 (4) (i) of the E-Waste (Management) Rules, 2022 and amendments thereof.*

## DC Charges for Delay in DC deposition

The Damage Cost and Financial Penalty shall be deposited by the producers / manufacturers / recyclers / refurbishers / any other violators / violating facility within the stipulated time period specified under directions issued by CPCB/SPCBs/PCCs. In case, such facility does not submit the same within the stipulated time frame the amount will be exponentially increased as per details given below:

**Table 52:** Delay in DC Deposition and Penalty to be imposed over the delay.

| S. No | Delay in DC Deposition | Penalty |
|---|---|---|
| 1 | Within one month after the stipulated time as per the directions by CPCB/SPCB/PCCs. | Original amount with interest @ 12% per annum for the number of days delayed after the stipulated time. |
| 2. | After one month and within three months after the stipulated time as per the directions by CPCB/SPCB/PCCs. | Original amount with interest @ 24 % per annum for the number of days delayed after the stipulated time. |
| 3. | After three months of the stipulated time as per the directions by CPCB/SPCB/PCCs. | a) Issue of show cause notice to the facility<br>b) Closure of unit/facility<br>c) Action as per section 15 (1) of the Environment (Protection) Act, 1986 |

## 9. Non- Compliance to Battery Waste Management Rules

DC is to be levied for non-compliance of the following provisions of Battery Waste Management Rules, 2022

**Table 53:** Provisions of Battery waste Management Rules, 2022 for which DC is to be levied.

| S. No. | Rule | Provision |
|---|---|---|
| 1. | 4(11) | Producer shall file annual returns in form 3 regarding the waste battery collected and recycled or refurbished towards fulfilling obligations under Extended Producer Responsibility with the Central Pollution Control Board and concerned State Pollution Control Board in Form 3 by 30th June of the next financial year. The details of the registered recyclers from whom the Extended Producer Responsibility certificates have been procured shall also be provided. |
| 2. | 4(12) | It shall be the responsibility of the producer to, -<br>(i) Adhere to prohibitions and labelling requirements as prescribed in Schedule- I, |
| 3. | 4(15) | Producer shall not deal with any other entity not having registration mandated under the rules. |
| 4. | 8(3) | Refurbishers shall furnish quarterly returns in Form 4 regarding the information on quantity of used Battery collected or received from various producers or entities, refurbished quantities, quantity of hazardous and/or other waste including solid waste or plastic waste generated after refurbishment and disposal of such quantity as per extant rules and the quarterly return shall be filed by the end of the month succeeding the end of the quarter. |
| 5. | 8(5) | Refurbisher shall not deal with any other entity not having registration mandated under these rules. |
| 6. | 9(3) | Recyclers shall furnish the quarterly returns in Form 4 regarding the information on quantity of Waste Battery collected or received from various producers or entity, recycled quantities, compliance of material-wise recovery percentage as per recovery targets provided under sub-rule 4 of rule 10, quantity of hazardous and/or other waste including solid waste or plastic waste generated after recycling and of such quantity as per extant rules and the quarterly/ return should be filed by the end of the month succeeding the end of the quarter. |

| | | |
|---|---|---|
| 7. | 9(5) | Recycler shall not deal with any other entity not having registration mandated under these rules. |
| 8. | 11(11)(12) | (11) Central Pollution Control Board shall carry out audit of data, including using information from Goods and Services Tax Network portal, by itself or a designated agency, of the registered entity under these rules.<br><br>(12) Central Pollution Control Roard shall suspend and/or cancel the registration of Producer, and/or impose Environmental Compensation in case of violation of these rules by the registered entity. |
| 9. | 13(1) (i) | Environmental Compensation shall also be levied for the following activities based on polluter pays principle, -<br><br>(i) Entities carrying out activities without registration as mandated under these rules |
| 10. | 13(1) (ii) | Environmental Compensation shall also be levied for the following activities based on polluter pays principle,<br><br>ii. providing false information/wilful concealment of material facts by the entities registered under these rules; |
| 11. | 13(1)(iii) | Environmental Compensation shall also be levied for the following activities based on polluter pays principle,<br><br>iii. submission of forged/manipulated documents by the entities registered under these rules; |
| 12. | 13(1)(iv) | Environmental Compensation shall also be levied for the following activities based on polluter pays principle,<br><br>iv. entities engaged in collection, segregation, and treatment in respect to not following sound handling of Waste Battery. |
| 13. | 13(4) | Environmental Compensation shall be levied by Central Pollution Control Board on Producer operating with respect to non-fulfilment of their Extended Producer Responsibility targets, responsibilities and obligations set out in Schedule-II of these rules. |
| 14. | 13(5) | Environmental Compensation shall be levied by respective State Pollution Control Board on entities involved in refurbishment or recycling of Waste Battery as well as entities involved in collection, segregation and treatment, operating in their jurisdiction with respect to non-fulfilment of their responsibilities and obligations set out under these rules. |

Damage Cost to be levied to the producers/Recyclers/Refurbishers is divided in two regimes:

(i) DC Regime 1- In this regime DC will be levied to the producers for non-fulfilment of metal wise EPR targets.

(ii) DC Regime 2- In this regime, DC will be levied to any entity for non-compliances of Battery Waste Management rules, 2022

*DC Regime 1*

In this regime, DC is calculated separated for following two types of batteries.

(i) For lead Acid Batteries

(ii) For Lithium-ion and Other Batteries

For both type of batteries calculation of DC includes cost of handling, collection and Transportation and cost of processing of waste battery.

- **For lead Acid Battery**

The cost component for DC Collection per tonne of Waste lead acid battery are as follows:

(i) Cost of Handling, Collection and Transportation of Waste Battery

(ii) Processing Cost to recover lead Metal

**Table 54:** The details of above cost incurred by the recycler of lithium ion Battery is given below:

| S.No. | Cost Components | INR |
|---|---|---|
| 1. | Handling, Collection and Transportation | Rs 3000 per tonne |
| 2. | Processing | Rs 15000 per tonne |
| Total Cost (Per Tonne) = DC Charges | | Rs 18000 |
| DC (per Kg) | | Rs 18 |

Since Lead is the only Key battery metal selected for Lead acid Battery, hence the DC Cost per kg for lead is equal to Rs 18.

This amount will be treated as the maximum cost of EPR credit for lead metal. EPR Credits cost for lead metal will be in the range Rs 5.4/Kg to Rs 18/Kg.

- **For Lithium-ion batteries and other batteries**

The cost components for DC calculation per tonne of waste lithium ion and other batteries are as follows:

(i) Cost of Handling, Collection and Transportation of Waste Battery = Rs 70000 per tonne

(ii) Processing Cost to recover key battery metals- summarized as below Table 55

**Table 55:** Processing Cost to recover key battery metals

| S.No. | Metals | Avg. Processing Cost (INR/Kg of Metal) |
|---|---|---|
| 1. | Lithium (Li) | 2330 |
| 2. | Cobalt (Co) | 485 |
| 3. | Nickel (Ni) | 485 |
| 4. | Manganese (Mn) | 485 |
| 5. | Copper (Cu) | 200 |
| 6. | Aluminum (Al) | 50 |
| 7. | Iron (Fe) | 50 |

Assuming that the battery contains equal quantity of all the 7 metals, the (iii) Cost of Handling, Collection and Transportation for each metal (per Kg metal) will be Rs 70.

Hence, the total cost of recovery of each metal is calculated by adding the cost of handling, collection and Transportation for each metal and processing of cost of each metal and this cost will serve as DC Cost for each metal.

**Table 56:** Damage Cost for individual metal

| S. No. | Metals | Total DC Cost (INR/Kg of Metal) = Avg. Cost of Collection Storage and Transportation + Avg. Processing Cost |
|---|---|---|
| 1. | Lithium (Li) | 2400 |
| 2. | Cobalt (Co) | 555 |
| 3. | Nickel (Ni) | 555 |
| 4. | Manganese (Mn) | 555 |
| 5. | Copper (Cu) | 270 |
| 6. | Aluminum (Al) | 120 |
| 7. | Iron (Fe) | 120 |

DC Cost for Cadmium and Zinc metals can be kept same as that of Lithium metal cost due to very limited availability of recycling infrastructure for recovery of these metals

**DC Regime 2-**

**DC based on application fees :**

For non-compliance other than shortfall in EPR targets, DC is calculated as:

(i) For 1st default- DC equivalent to application fees as per SoP for registeration of Producers/Recyclers/Refurbishers under battery waste management rules, 2022, i.e. Rs. 20,000/-

(ii) For 2nd Default – two times of first default i.e. Rs 20,000X2 = Rs 40,000

(iii) For 3rd Default- Two times of second default i.e. Rs 40,000X2= Rs 80,000/-

*The DC cost in this regime will increase 10% every Year.

**Table 57:** Violations under BMW Rules, 2022 and type of DC to be levied.

| Rule | Provision | Violator | Violation | DC to be levied |
|---|---|---|---|---|
| 4(11) | Producer shall file annual returns in form 3 regarding the waste battery collected and recycled or refurbished towards fulfilling obligations under Extended Producer Responsibility with the Central Pollution Control Board and concerned State Pollution Control Board in Form 3 by 30th June of the next financial year. The details of the registered recyclers from whom the Extended Producer Responsibility certificates have been procured shall also be provided. | Producer | Non-Submission of Annual Returns | DC Regime 2 |
| 4(12) | It shall be the responsibility of the producer to, -<br>Adhere to prohibitions and labelling requirements as prescribed in Schedule- I, | Producer | Not following labelling Requirements | DC Regime 2 |
| 4(15) | Producer shall not deal with any other entity not having registration mandated under the rules. | Producer | Engaging with entities not registered on the portal | DC Regime 2 |
| 8(3) & 9(3) | Refurbishers/ Recycler shall furnish quarterly returns in Form 4 regarding the information on quantity of used Battery collected or received from various producers or entities, refurbished quantities, quantity of hazardous and/or other waste including solid waste or plastic waste generated after refurbishment and disposal of such quantity as per extant rules and the | Refurbishers/ Recycler | Non-Submission of Quarterly returns | DC Regime 2 |

| | | | | |
|---|---|---|---|---|
| | quarterly return shall be filed by the end of the month succeeding the end of the quarter. | | | |
| 8(5) & 9(5) | Refurbisher/ Recycler shall not deal with any other entity not having registration mandated under these rules. | Refurbisher/ Recycler | Engaging with entities not registered on the portal | DC Regime 2 |
| 11 (11) | Central Pollution Control Board shall carry out audit of data, including using information from Goods and Services Tax Network portal, by itself or a designated agency, of the registered entity under these rules.<br><br>Central Pollution Control Roard shall suspend and/or cancel the registration of Producer, and/or impose Environmental Compensation in case of violation of these rules by the registered entity. | Producer, Recycler, Refurbisher | Non-Compliance found in the third party audit | DC Regime 2 and Action as per E(P) Act, 1986 |
| 13(1) | Entities carrying out activities without registration as mandated under these rules<br><br>ii. providing false information/wilful concealment of material facts by the entities registered under these rules;<br><br>iii. submission of forged/manipulated documents by the entities registered under these rules;<br><br>iv. entities engaged in collection, segregation, and treatment in respect to not following sound handling of Waste Battery. | Producer, Recycler, Refurbisher, Entities engaged in collection, segregation | False reporting / not registered on the portal / improper handling of battery waste | 1. DC Regime 2<br><br>2. Action as per provisions of section 15 of EPA, 1986<br><br>3. Action (increase in DC amount, cancellation of registration etc.) as deemed necessary by the Competent Authority, CPCB. |
| 13(4) | Environmental Compensation shall be levied by Central | Producer | Non-Fulfilment of Targets | Based on DC Regime 1 |

| | | | | |
|---|---|---|---|---|
| | Pollution Control Board on Producer operating with respect to non-fulfilment of their Extended Producer Responsibility targets, responsibilities and obligations set out in Schedule-II of these rules. | | | |
| 13(5) | Environmental Compensation shall be levied by respective State Pollution Control Board on entities involved in refurbishment or recycling of Waste Battery as well as entities involved in collection, segregation and treatment, operating in their jurisdiction with respect to non-fulfilment of their responsibilities and obligations set out under these rules. | Recycler and Refurbisher | Non- Fulfilment of the responsibilities laid out in the rules | 1. Based on DC regime 2<br>2. Action (increase in DC Amount, Cancellation of registration etc.) as deemed necessary by the Competent Authority, CPCB<br>3. Penalty as per Section 15 of EPA 1986 |

**Note:**

1. Payment of DC shall not absolve producer of EPR obligation set out under these rules

(i) The unfulfilled EPR obligation for a particular year will be carried out to the next year for a period of three years.

(ii) In case the shortfall of EPR obligation is addressed within subsequent years within 3 years, the DC levied shall be returned to the producer as given below,

- Within one year of levying of Environmental Compensation: 75 percent return;
- Within 2 years: 60 percent return;
- Within 3 years: 40 percent returns

2. After completion of three years after Damage Cost getting due, the entire DC amount shall be forfeited, this arrangement shall allow for collection and

refurbishment or recycling of waste battery by the concerned entities in later years as well.

- **DC Charges for Delay in DC Deposition-**

The Damage Cost Charges and financial penalty shall be deposited by the entities which violates the provisions stipulated under BMW Rules 2022. In case, such entity does not submit the same within the stipulated time frame the amount will be increased as per details given in table Below 58:

**Table 58:** Provision of DC Charges for delay in DC Deposition:

| S. No. | DC Amount deposition time period | DC and financial Penalty Amount |
|---|---|---|
| 1. | Within one month from the stipulated time period as directed by CPCB/SPCB/PCC | Original Amount with interest @12% per annum for no. of days delayed after the stipulated date of amount deposition. |
| 2. | After one month but within three-month from the stipulated time period as directed by CPCB/SPCB/PCC | Original Amount with interest @24% per annum for no. of days delayed after one month of the stipulated date of amount deposition. |
| 3. | After three months | (a) Closure of unit/facility<br>(b) Seizure of trade documents<br>(c) Action as per Section 15 (1) of EPA. |

## 10. Non- Compliance to Tyre Waste Management Rules

DC is to be levied for non- compliance for the following provisions of the HOW (M &TM) Amendment Rules, 2022

**Table 59:** Provisions under HOW (M & TM ) Amendment Rules, 2022 for which DC is to be levied and violation

| Rules | Provisions |
|---|---|
| 3(2),<br>10 (3) | No entity (Producer, Recycler and Retreader) shall carry out any business without registration.<br>The environmental compensation shall also be levied on unregistered producers, recyclers and any entity which aids or abets the violation of the provisions of this Schedule. |
| 3(3) | The entities registered under sub-paragraph (1) shall not deal with any unregistered producer or recycler |
| 3(4),<br>10(2) | In case any registered entity furnishes false information or wilfully conceals information for getting registration or return or report or information required to be provided or furnished under this Schedule or in case of any irregularity, the registration of such entity may be revoked by the Central Pollution Control Board for a period up to three years after giving an opportunity of being heard and in addition Environmental compensation charges may also be levied in such cases as per paragraph 10.<br>The environmental compensation shall also be levied on the recyclers for issue of false extended producer responsibility certificate and providing false information |
| 3(5) | In case any entity is covered in more than one category under paragraph 3, then the said entity shall register under those categories separately. |
| 4(1),<br>4(4)(i),<br>7(i) | All producers shall fulfil the extended producer responsibility obligations. The producer shall fulfil their extended producer responsibility obligation through online purchase of extended producer responsibility certificate from registered recyclers only |
| 4(4)(ii) | The quarterly return shall be filed by the end of the month succeeding the end of the quarter. |

| | |
|---|---|
| 4(4)(iii) | The details provided by producers and registered recyclers shall be cross-checked on the portal. |
| 5(3) (a) | The validity of the extended producer Renewal certificate shall be two years from the end of the financial year in which it was generated. |
| 4(4)(ii), 7(2), 8(2), 8(A)(2) | The producer shall be responsible to file annual and quarterly returns in the forms as specified by the Central Pollution Control Board on the portal on or before the end of the month succeeding the quarter to which the return relates and each registered entity shall have to file the quarterly return.<br><br>All the recycler/retreader shall file annual and quarterly returns in the Form as specified on the portal on or before the end of the month succeeding the quarter to which the return relates. |
| 8(1), 8(A)(1) | The Recycler/Retreader shall submit on monthly basis the information regarding quantity of waste tyres used and end product produced, extended producer responsibility certificate sold and such other information on the portal. |
| 10(1), 10(2) | Producers in case of non-fulfilment of obligations set out in this Schedule and use of false extended producer responsibility certificate |
| 10(5) | Any false information resulting in over generation of extended producer responsibility certificates by recycler above 5% of the actual recycled waste shall result in revocation of EPR registration and imposition of environmental compensation which shall not be returnable. |
| | Any other violations under the HOW (M &TM) Amendments Rules 2022,2024. |

*Assessment of Damage Cost to be levied for violation of the any other sub-rules of the HOW (M &TM) Amendments Rules, 2022 or any other violation other than mentioned the table above shall be done on case to case basis.

Approach for Assessment of Damage Cost (DC)

(i) DC Regime 1 – In this regime, DC will be levied to the producers for non-fulfilment of EPR- Obligations.

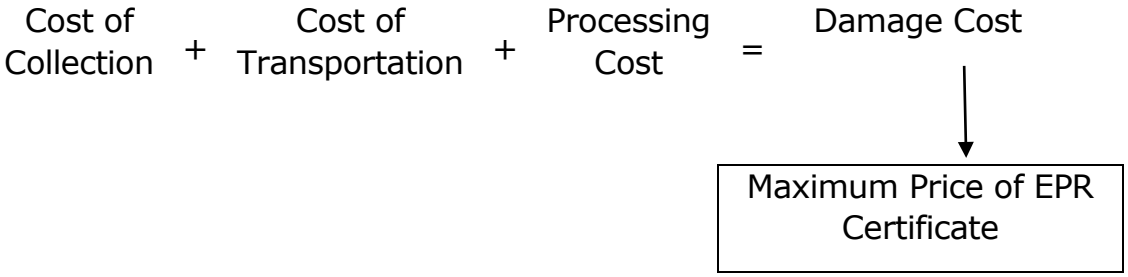


***Figure 05:*** *Approach for Assessment of Damage Cost (DC)*

(Cost of Collection + Cost of Transportation + Processing Cost) per kg of waste tyre = Rs 8.40

DC 1= (Cost of Collection + Cost of Transportation + Processing Cost) of waste tyre = INR 8.40 X EPR Target Shortfall

**A**. DC Regime 2 – DC regime 2 will be applicable for the violations under provisions of the HOW (M &TM) Amendments Rules, 2022 except EPR Obligation violation by producers, Under this regime, the basis for calculation of DC shall be registration fee.

**(i)** For Producers the registration fee for registration on the EPR portal is Rs. 25000 + Rs. 0.625 per tonnes of tyre manufactured/imported in the preceding two years.

For 1st Default- Rs 25000

For 2nd Default- Two times of first default i.e. Rs. 25000 X 2 = Rs 50,000

For 3rd Default – Two times of second default i.e. Rs 50,000 X 2 = Rs 10000

**(ii)** For Providing false sales data resulting in EPR obligation less than the actual EPR obligation then DC = Rs 25000 + quantity of false sales data X Rs 8.40 per Kg of false sales data

**(iii)** For Recyclers and Retreaders the registration fee on the EPR Portal is Rs 15000 and Rs 10000 respectively. So, taking Rs 12500 as an average, the DC to Recyclers and Retreaders are as below

For 1st Default – Rs 12500
For 2nd Default – Two times of first default i.e. Rs 12500 X 2= Rs 25000
For 3rd Default – Two times of second default i.e. Rs. 25000 X 2 = Rs. 50000

(B) For informal/ illegal sale/ storage/ transportation/ Rereading/ Recycling of Waste tyre by any non-registered entity/ person/ shop/ entity, DC Regime 2 will be applicable and the DC will be as below:

DC = Rs 12500 + Quantity of waste tyre seized X Rs 8.40 per Kg of seized waste tyre

(C) Submission of false information resulting in over generation of EPR certificates / retreading certificate, DC regime will be applicable and DC will be as below:

DC= Rs 12500 + Quantity of False EPR/ Retreading certificate generated X Rs 8.40 per Kg of False EPR/Retreading certificates generated

**Table 60:** Details of DC to be levied & punitive actions to be taken for non-compliance of HOW (M & TM ) Amendment Rules, 2022

| S. No. | Entities | Violation | Damage Cost and Actions |
|---|---|---|---|
| **Registration on EPR Waste Tyre Portal** | | | |
| 1. | Producer, Recycler, Retreader | Operating without registration/ Non-compliance of conditions stipulated in Certificate | 1. DC Regime 2<br>2. The applicant has to register on the Waste Tyre EPR Portal and the DC will be levied.<br>3. Action as per Environment (Protection) Act, 1986<br>4. Penalty as per Section |

| | | | |
|---|---|---|---|
| 2. | | Entitydealing with unregistered entities | DC Regime 2 |
| 3. | | Registered only in one type of entity | DC Regime 2 |
| 4. | | Operating without valid registration- Failure in renewal of Registration in time as prescribed under the rules | Respective DC Regime 2 as below:<br>1st default regime till 15 days.<br>2nd default regime from 16th day till 30th Day and<br>3rd default regime from 31st day till grant of registration |
| **Submission of false information or wilfully concealing Information** | | | |
| 5. | Producer,<br>Recycler,<br>Retreader | Submission of false information and/or willful concealment of information | 1. DC Regime 2 [A (i) + A(ii)]<br>2. and beyond 3rd default, cancellation of registration issued by CPCB up to three years.<br>3. Action as per Environment (Protection) Act, 1986<br>4. Penalty as per Section 15 of Environment (Protection) Act, 1986 |

| | | | |
|---|---|---|---|
| 6. | Recycler | Submission of false information resulting in over generation of EPR certificates | 1. DC Regime 2 [A (iii) + C] and suspension of registration issued by CPCB for a period of one year for 1st default, suspension for 2 years for 2nd default and suspension of 3 years for 3rd default<br><br>2. Action as per Environment (Protection) Act, 1986<br><br>3. Penalty as per Section 15 of Environment (Protection) Act, 1986 |
| | **Annual and quarterly returns filings** | | |
| 7. | Producer, Recycler, Retreader | Failure in filing the annual returns | 1. Notice will be issued for 10 days after the last date of return filings.<br>2. Thereafter Respective DC Regime 2 as below:<br>3. 1st default regime if filed within 15 days after the last day of return filing<br>4. 2nd default regime if filed within 30 days after the last day of return filing<br>5. 3rd default regime if filed within 60 days after the last day of return filing<br>6. Thereafter AR to be auto filled on the EPR Portal and DC will be levied on shortfall in recycling target, if any, in addition to DC charges calculated as at points from7(iii) to 7(v) above.<br><br>If due to force majeure conditions, the Producers are not able to file the AR, within the period of 60 |

| | | | |
|---|---|---|---|
| | **Failure in fulfilling the obligation by Producer** | | |
| 8. | Producer | Failure in fulfilling the EPR obligation | DC Regime 1 will be applicable |
| **EPR Certificates / Retreading Certificates** | | | |
| 9 | Producer | Transaction or use of false extended producer responsibility certificate or any unethical practice for transaction of certificate | DC Regime 2 [ A(i) + A (ii)]<br>and immediate suspension of registration issued by CPCB for a period of six months to three years as decided by the competent Authority CPCB |
| 10 | Recycler/Retreader | Transaction or use of false extended producer responsibility certificate or any unethical practice for transaction of certificate<br>Submission of False information resulting in over generation of EPR certificates /refurbishing | DC Regime 2 and immediate suspension of registration issued by CPCB for a period of six months to three years as decided by the competent Authority CPCB |
| **Improper Recycling/Retreading of Waste Tyres** | | | |
| 11 | Recycler/Retreader | Non-compliance of Recycling SOP | 1. DC Regime 2<br>2. Action as per Environment (Protection) Act, 1986<br>3. Penalty as per Section 15 of Environment (Protection) Act, 1986 |
| **Audit** | | | |

| | | | |
|---|---|---|---|
| 12 | Producer/<br>Recycler/<br>Retreaders | Non-Compliance Found in Audit | 1. DC Regime 2<br>2. For continued violation, (increase in DC amount, Closure of unit/ Cancellation of CTO and Authorization under HOWM Rules etc. as the case may be,) as deemed necessary by the Competent Authority, CPCB<br>3. Action as per Environment (Protection) Act, 1986<br>4. Penalty as per Section 15 of Environment (Protection) Act, 1986 |
| **Any other violation** | | | |
| 13 | Producer/Recycler/ Retreaders | Any other violation not listed above | 1. DC Regime 2<br>2. Action as per Environment (Protection) Act, 1986<br>3. Penalty as per Section 15 Environment (Protection) Act, 1986 |

The DC shall be deposited by the violating facility within the stipulated time period specified under directions issued by CPCB/SPCB/PCC. In case, such facility does not submit the same within the stipulated time frame the amount will be exponentially increased as below,

**Table 61:** DC Charges and Financial Penalty w.r.t. delay in DC deposition

| S. No. | Delay in DC Deposition | Penalty |
|---|---|---|
| 1. | Within one month after the stipulated time as per directions by CPCB/SPCB/PCC | Original amount with interest @ 12% per annum for number of days delayed after the stipulated time |
| 2. | After one month and within 03 months after the stipulated time as per directions by CPCB/SPCB/PCC | Original amount with interest @ 24% per annum for number of days delayed after the stipulated time |
| 3. | After 03 months of the stipulated time as per directions by CPCB/SPCB/PCC | a) Issue of Show cause notice to the facility.<br>b) Closure of unit/facility<br>c) Action as per section 15 of the Environment (Protection) Act, 1986 |

## 11. Non-Compliance to Mining O/B Dump and Muck Management

To control air and surface water pollution, implement effective measures such as proper landscaping with consolidated slopes and planting vegetation on non-active dumps using geotexturing techniques. These strategies stabilize soil, prevent erosion, and contribute to improved air quality, offering a comprehensive approach to pollution mitigation.

The DC charges can be estimated based on avoidance cost. Every project (Mining, Infra and Industry) needs to prepare and submit a Hydrogeology report which is prepared by NABET Accredited Consultant. The Report contains surface water precipitation due to Annual Rainfall and different ROC as per the surface area features. Surplus surface water management requires following,

1) Garland drains length and size
2) No of RWH Recharge Structure
3) Size and length of toe drains
4) No of check dams with size
5) No of settling tanks / ponds with size to decant / filter and subsequent excess water discharge to nearby streams / nallas.

Based on the overall CAPEX and maintenance cost of the above requirements, an estimation can be made on avoided cost or cost saved. Accordingly, a suitable DC can be levied.

## 12. Non-compliance to Energy Conservation measures

The Bureau of Energy Efficiency (BEE) India, has launched new version of code ECBC (Energy Consecration and Building Code) 2017. Previously ECBC 2007 was launched by Ministry of Power (MoP) (Ali and Ruchi, 2019). Energy standards for new commercial buildings were set. This code promotes renewable energy, is technology neutral, and emphasizes on the life cycle cost of building.

The Energy Performance standards are divided into three levels based on the savings (BEE, MoP)

- ECBC- building has approx. 25% savings.
- ECBC plus- building has approx. 35% savings.
- Super ECBC- building has savings of 50% or more.

This new building code also encourages the public and private sectors to meet the ECBC criteria and exceed beyond. There are two routes given by the code to comply the requirements: Prescriptive route and Whole building performance route. In prescriptive route, the building individually comply with all the mandatory measures, allowing trade-off between various parts of the building envelope. This route is more flexible to the designer. In the whole building performance, to comply with the code the annual energy use of the proposed design must be less than the that of the standard design (Tulsyan et al., 2013).

The cost of Non-compliance under different conditions shall be assessed as following,

- If the project is under operation where it is partially complied except building envelope, there impact of excess energy consumption will be assessed on prorata basis and cost saved / Avoidance cost will be levied
- If construction is under completion stage and the envelope is not provided with DC conditions, the PP will be directed to comply with DC conditions.
- The compensation will be applicable in operating projects where DC is partially complied excepting the building envelope. The percentage of energy saving will be assessed on prorata basis. Capex for provision of DC is around 7%-10% of the project cost and saving in energy is in the order of 20-30% as compared with conventional provision.
- The committee will assess the cost of impact considering the excess energy consumption on prorata basis and the remediation will be assessed accordingly for the period for violation. Solar power generation at the rate of 1% of maximum demand to be provided (In building sector – as per NBC code), the impact cost will be assessed based on the gap and its Capex. The excess energy consumption will be assessed and the energy cost levied as damage / remediation during violation period.
- In case of commercial buildings, 20% of water heating by solar system (NBC code) and non-provision will attract the cost of impact (cost saved).

**Energy Conservation & Building Code (ECBC) damage assessment**

General Condition

1. Keeping the weightage given below in tble no. 50 as reference for all cases, damage will be assessed and damage cost will be calculated based on total weightage and in reference to the following base rules,
   (i) Cost for usage of excess energy is INR 8 Per KwH
   (ii) Capex for provision of DC is around 7%-10% of the project cost
   (iii) Saving in energy is in the order of 20-30% as compared with conventional provision.
   (iv) Mandatory Requirements - The mandatory requirements are described in CGECBC under sections 3.2.1, 4.2, 5.2, 6.2 and 7.2 of the CGECBC code.

2. Apart from EC compliance, as per MoEFCC guideline 1% of total energy demand (working load) to be from renewable source like solar panels, etc. This is mandatory for all sectors.
3. For all commercial buildings 20% of heated water requirement should be from solar based installation / solar water heaters.

The DC Cost Methodology is as follows:

$$\mathbf{EDC=[(E_{Actual}-E_{ECBC})\times C_E+(P\times C)+W\times 0.2\times H]\times V}$$

wherein terminologies of the formula are defined in the **table 62** as below:

| | |
|---|---|
| ▪ **$E_{Actual}$ = Annual energy consumption (kWh/year)** | ▪ **$E_{ECBC}$ = Estimated energy consumption if ECBC compliant (kWh/year)** |
| ▪ **P = Project cost (₹)** | ▪ **C = Capital expenditure for compliance (7–10% of P)** |
| ▪ **$C_E$ = Cost of Energy (as per market rate)** | ▪ **0.2 = 20% hot water must be solar powered – NBC regulation** |
| ▪ **H = Cost per litre for solar-heated water** | ▪ **W = Hot water demand (liters)** |
| ▪ **V = Violation period (years)** | |

- No Double Counting: Capex (P × C) includes all ECBC compliance costs (e.g., insulation, efficient systems, renewable provision).

- Solar Water Heating Term [W × 0.2 × H ] should be:

  - Included if 20% solar heating (NBC Code) is not covered in project cost.
  - Excluded if solar water heating is already part of the Capex (P× C).

- This formula provide a transparent, fair, and enforceable cost-based penalty for buildings not complying with ECBC 2017, based on:
    - Environmental impact (excess energy use),
    - Avoided capital cost
    - Non-adoption of mandated renewable energy norms.

**Table 63:** Weightage table of attributes for compliance of ECBC provision

| S. No | Attributes Considered For Damage Assessment Under ECBC Compliance | Total Weightage |
|---|---|---|
| 1 | Building envelope<br>• Roof – 5%<br>• External walls – 5%<br>• Fenestration – 10% | 20% |
| 2 | Mechanical systems & equipment's including HVAC | 30% |
| 3 | Lighting<br>• Internal – 10%<br>• External – 10% | 20% |
| 4 | Electrical power & motors<br>• Pumps- 5%<br>• Motors- 10%<br>• Pneumatics like lifts- 5% | 20% |
| 5 | Implementation / installation of renewable systems | 10% |

## 13. Non-Compliance with respect to Green Belt and Green Cover

The rationale for tree plantation and the creation of green belts encompasses various reasons for ecological conservation and protection. One significant aspect is the provision of pure oxygen for respiration. Through photosynthesis, trees release oxygen into the atmosphere, contributing to the overall air quality. Furthermore, tree roots play a crucial role in preventing soil erosion by tightly holding the soil together. This helps maintain the integrity of the land and reduces the risk of soil erosion caused by wind or water.

In addition, green belts and plantations have the capacity to mitigate air pollution and attenuate noise pollution. Trees act as natural filters, trapping pollutants and particulate matter, thus improving air quality. They also serve as sound barriers, reducing noise levels and creating a more serene environment. Another important benefit of tree plantations and green belts is carbon sequestration. Trees capture, remove, and store carbon dioxide ($CO_2$) from the atmosphere through the process of photosynthesis. This aids in reducing greenhouse gas emissions and mitigating climate change. On average, a tree can sequester around 250 kg of $CO_2$ (Eco Matcher).

## Estimation of damage cost for non-compliance to green belt and plantation

- Restoration Cost Use Method / Cost Saved Method: Restoration of affected natural systems, such as vegetation, forest and green etc.
- Market Price Method: Cost-based methods, cost based valuation, methods include replacement cost, restoration cost.

## Greenbelt & Plantation – Building & Infra Projects

According to the National Building Code (NBC), it is mandatory for project proponents (PP) to plant one tree for every 80 Sq. Meter of plot area during the construction process. This tree-planting requirement must be fulfilled within a span of three years from the beginning of construction. Failure to comply with this regulation will result in a damage cost. This damage cost shall be levied based on the On-ground damage assessment basis. A thorough on-ground study shall be carried out to arrive at the damage cost. Additionally, there are specific rules regarding tree cutting and replacement in different areas. In rural and urban areas, for every tree cut, three trees must be planted within the neighborhood. In metropolitan and megacity areas, the rule is more stringent, requiring the planting of ten trees for every tree cut, as per the Delhi High Court ruling.

These regulations aim to promote tree conservation and offset the environmental impact of tree removal during construction or development projects. By ensuring that trees are replanted in sufficient numbers, the ecological balance and green cover can be maintained or improved, benefiting both rural and urban environments.

It is important for project proponents, particularly in urban and metropolitan areas, to adhere to these regulations to mitigate the loss of green spaces and preserve the environmental health of the surrounding areas.

## Greenbelt & Plantation – Mining & Other Industries

According to the guidelines, the provision of a Green Belt (GB) is mandatory in various areas. Along the main lease (ML) boundary, a minimum width of 7.5 meters should be maintained for the GB. Additionally, a GB with a width of 7.5 meters should be provided in the safety zone. Along watercourses, a GB with a width of 50 meters on both sides of the boundary is required. Plantation efforts should focus on active dumps and non-operational areas.

The total area covered by the GB should amount to 33% of the total lease area over a period of 5 years, with an annual increase of 6.6%. This translates to planting 2500 trees per hectare. The Environmental Appraisal Committee (EAC) will evaluate compliance with these requirements, and damage cost will be estimated based on the shortfall in the number of trees according to the Central Pollution Control Board (CPCB) report.

For industries, a minimum of 33% of the plot area should be covered with a GB and plantation. This should be achieved within 5 years from the start of construction. Any deficiency in meeting this requirement will result in a Damage cost being levied at Rs. 1000 per tree and cost of tree plantation may be taken as Rs 500 per tree.

Native species should be prioritized, with 2500 plants per hectare (as per CPCB) being planted over the 5-year period. These regulations aim to ensure the establishment and maintenance of Green Belts and plantations, which play a crucial role in environmental conservation and mitigation efforts. Compliance with these guidelines is essential to maintain ecological balance and promote sustainable practices within industrial and developmental projects.

## 6. Conclusion

Over the last few decades, India has experienced significant urbanization and industrialization. While growth has been prioritized, environmental concerns have often been neglected. Humans have altered ecosystems faster and more widely in the last 50 years than at any other time in human history, mostly to fulfill rapidly increasing demands for food, fresh water, lumber, fiber, and fuel. As a result, there has been a significant and largely irreversible reduction in the diversity of life on Earth. The economic evaluation aims to value the impact on human well-being caused by changes in the surrounding ecosystem or environment due to harmful emissions and negative impacts by commercial or industrial sectors. An approach to evaluate the total environmental damage cost is discussed in this report. Focus is given to various parts of the environment, including air, water, land, vegetation, solid waste, ecology and biodiversity, risk assessment, OHS, etc. The Environment Damage Cost Assessment calculation is structured in three groups of conditions:

I. Non-compliance of environmental approval conditions with the feasibility of assessing damage on the ground.
II. Non-compliance of environmental approval conditions where on-ground damage cannot be assessed.
III. Non-compliance to environmental approvals, which are only procedural in nature, does not cause any environmental damage.

The parameters concerning on-ground damage assessment shall be evaluated for the damage cost assessment using Equation (1). However, if the on-ground damage cannot be assessed, the compensation shall be evaluated using direct formulas.

This report particularly focuses on Damage cost and Compensation cost due to air pollution, water pollution, solid and hazardous waste, Land Environment, Ecology and Biodiversity, Noise Environment, Ground and Surface water, Disaster Management and Risk assessment, and Energy Conservation. On the basis of ground damage assessment, various studies on environmental valuation for these parameters have been analyzed, and their values for India's emissions have been worked out. Meta-analysis is performed, and the key observations from referred studies are mentioned in the respective sections. Methods such as VOLY, VSL, benefits transfer, dose-response function, and output and input distance function are used in the referred studies. The rates are converted to INR using Inflation rates and PPP. Further, we performed Statistical Analysis to arrive at the upper and lower range.

As per the WHO and OECD data, the estimated cost of premature death and disability from air pollution in Europe is approximately USD 1.6 trillion. The gases released from industrial activities are primarily responsible for air pollution. The primary and secondary pollutants negatively impact several components like human life, visibility, agriculture, tourism and other components of the environment. The formation of smog due to suspended PM and $O_3$ formation is responsible for reduced visibility. This also has an impact on the flora. The materials also get affected due to atmospheric

pollutants. In this report, we have considered the estimates available in India and other countries. The studies have considered health, mortality, morbidity, infrastructure, resources, and materials to arrive at the air pollution damage cost.

Water pollution is one of the most serious issues that developing countries face. The release of disease-causing agents like E. coli into water, synthetic organic pollutants, oil spillages, and many other factors leads to water pollution. The water pollution adversely impacts fishery, human health, and several recreational activities. To put a monetary value on damage, substantiation and inventory data such as biomagnification factor, dose-response, wastewater treatment level, geological parameters, regulatory enforcement, characteristics of receiving water body, usage of water and food products derived from the area affected, and so on are required. The proponent shall use the value Transfer Method or Avoided cost method based on the available data. The amount for reduction of BOD, COD, and TSS is considered for water pollution damage cost using VTM. We have analysed the Avoided cost for different treatment processes of the effluent treatment plant based on the capex and opex parameters. Equation (3) is used to evaluate the damage based on ACM. The ZLD (Zero Liquid Discharge) which is currently incorporated in most of the treatment plants can also be analysed for the damage cost assessment using ACM.

According to the PIB, India generated 62 million tonnes of solid waste in 2017, of which 70% was collected, 28% was processed, and the residue was disposed of in landfills. Increased production of solid waste as a result of economic development raises concerns about efficient collection, separation, and safe disposal. Organic trash, plastic, rubber, textiles, leather, metals, glass, and other sorts of waste make up a typical solid waste stream. The characteristics of solid waste differ from industry to industry. LandGem and SWEET model can be used to quantify the pollutants. Solid waste leads to various environmental impacts like GHG emissions, aesthetic loss, and leachate discharge. We have discussed a brief methodology to estimate the damage cost for Mega Solid Waste Landfill sites. Studies have estimated the damage cost of solid waste based on incineration and landfills. Shadow price method, LIME model, and SCC are the methods considered to evaluate the damage cost of solid waste. Externality cost shall be when the data based on capacity of the MSW is available.

A summary of the damage cost for air, water, solid waste and hazardous waste using VTM is prepared below:

1. Air
    - PM 10 - 1462 Per Kg.
    - PM 2.5 - 2463 per Kg.
    - NOx - 460 per Kg.
    - SOx - 516 per Kg.
2. Water
    - BOD – 716 INR/Kg
    - COD – 515 INR/Kg
    - TSS – 222 INR/Kg

3. Solid waste

The mean value of damage cost for landfill is 648 INR/ton, and for Incineration, it is 833 INR/ton. Further, if the data regarding the MSW management is available with the proponent, Table 43 exemplifies the externality cost to be levied on the municipal solid waste improper management.

4. Hazardous waste

The cost of regulating, transporting, treating and disposing of HW is INR 9533 per tonne.

The environmental damage/ compensation for the abstraction of groundwater is derived considering the Deterrence factor as per the CWGA SO 3289 (E). Extraction of groundwater for commercial use by industries, infrastructure units, and mining projects without a valid No Objection Certificate from the appropriate authority, entities shall be liable to pay damage cost. Monetary values of mining and infra-dewatering projects using GW without NOC and the industrial units are described. Monetary values for GW abstracted for bulk water tanker supplies are also listed for various categories.

Land pollution from industrial practices, improper waste management, agriculture, and urbanization is a significant environmental concern. It harms the environment, including soil degradation, groundwater contamination, air pollution, and biodiversity loss. Topsoil loss and water erosion have high economic and environmental costs. Studies have shown that water erosion at an average rate of 23 tonnes per hectare results in the loss of 365 mm of overland flow and 590 kg of nutrients per hectare. The cost of replacing lost nutrients through inorganic fertilizers is estimated to be INR 8,893 per hectare (2012), rising to INR 16,000 per hectare (2022). These losses cause ecological damage, deplete soil biodiversity, change soil structure, and impact plant composition. Land pollution also affects agricultural production, leading to crop yield loss. Damage costs for vegetation can be estimated using NDVI data, highlighting the importance of reclamation efforts and increased vegetation area for carbon sequestration and cost savings. Effective management measures, such as proper waste management, soil conservation, and pollution control, are crucial for mitigating land pollution. Adherence to environmental regulations and sustainable land use practices is essential to minimize its adverse impacts on human health, ecosystem functioning, and sustainable development.

The rapid expansion of human activities, driven by population growth, industrialization, urbanization, and resource exploitation, has produced substantial emissions containing pollutants and harmful substances. This environmental imbalance has caused a loss of biodiversity, disruptions to ecosystems, and habitat destruction, pushing many species to the brink of extinction. Establishing green belts, implementing plantation initiatives, and adhering to tree planting regulations during

construction and industrial projects are vital for upholding ecological balance, preventing soil erosion, mitigating air and noise pollution, and reducing greenhouse gas emissions. Wildlife conservation and management plans safeguard biodiversity, preserve habitats, prevent poaching, and promote sustainable practices. Non-compliance with these plans may lead to penalties and expenses for damages, incentivizing adherence and minimizing the impact on wildlife and their habitats. Pollution negatively impacts ecology and biodiversity, altering ecosystem function, disrupting the food chain, and introducing invasive species. Reducing pollution and protecting natural ecosystems are essential for preserving biodiversity. Estimating damage costs involves evaluating restoration costs and complying with wildlife authorities. The damage cost is levied on a cost-saved basis for building infra-mining and other industries.

Noise pollution poses significant concerns for human health and well-being. Excessive noise levels from construction, mining, industrial activities, and diesel generators can harm individuals in close proximity. Violators of permissible noise limits outlined in regulations, such as the National Noise Rules of 2000, face penalties and remediation costs. Noise pollution can cause hearing loss, sleep disturbance, and increased stress levels. Guidelines recommend average noise levels in residential areas not exceeding 55 dB during the day and 45 dB at night. Estimating costs associated with noise pollution include penalties, remediation expenses, and implementing noise reduction measures. The penalty cost for DG sets and construction equipment are mentioned in the report.

The operational guidelines of the Centre’s flagship Swachh Bharat Mission 2.0 had made it mandatory for cities with a population of less than a million to clear legacy waste sites by March 31, 2023. Cities with a population of more than a million are to remediate their dumpsites by March 31, 2024. Legacy waste dumped over a long period of time, may be non-segregated degradable or non-degradable, vary in composition depending on the location and the age of dump. However, there is no guideline in order to qualify the legacy waste based on its age. The reclaimed legacy sites has been studied to arrive at the treatment and disposal cost per tonne. On an average the cost spend on treatment and disposal is around Rs.650 per tonnage of legacy waste.

The Energy Conservation and Building Code (ECBC) launched by India's Bureau of Energy Efficiency (BEE) sets energy standards for commercial buildings, promoting renewable energy and emphasizing life cycle costs. The ECBC 2017 categorizes energy performance standards into three levels based on energy savings achieved. Compliance routes include individual component compliance and whole building performance. The code's key features include applicability to commercial buildings with specific load or contract demand, provisions for daylight harvesting, shading, renewable energy systems, and the aim of achieving near-zero energy buildings. The damage cost will be applicable to the projects adhering to the EC compliances, energy consumptions and the project-specific conditions. Solar power generation and solar-based water heating requirements are also taken into account. The attributes to be considered with their respective weightage for damage assessment are described in

this section. The Environment compensation equation (equation 7) shall be used for calculations when on-ground damage assessment has not performed. The estimated total environmental damage cost will significantly depend on the feasibility of on-ground damage assessment.

This study serves as an effective manual for determining the cost of damage to the environment caused by any industrial activity or human meddling, covering all the important perspectives. The government institutions, ministries, and agencies will be able to figure out the damage done as well as the repercussions that are to be imposed on the industry in concern.

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**File No. J-11013/40/2020.IA.I(M).Pt.1**
**Government of India**
**Ministry of Environment, Forest & Climate Change**
**Impact Assessment Division**
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Indira Paryavaran Bhavan,
Jor Bagh Road, New Delhi-110 003

Dated: 22nd November, 2022

**OFFICE ORDER**

**Sub:- Constitution of the Committee on Environmental Damage Cost Assessment in compliance with Hon'ble NGT Order dated 02.12.2021 in the matter of OA No. 175 of 2018 titled as Jammula Chhoudaraiah Vs Union of India & Ors.-reg.**

In pursuance to the Hon'ble National Green Tribunal(NGT), Principal Bench, New Delhi Order dated 02.12.2021 in the matter of OA No. 175 of 2018 titled as Jammula Chhoudaraiah Vs Union of India & Ors. tagged along with other three matters, the Government of India in the Ministry of Environment, Forest and Climate Change hereby constitutes the Expert Committee (hereinafter referred as the Committee) to determine appropriate methodology for assessment of Environmental Compensation for loss/damage/degradation to environment, with the following composition:

| Sl. No. | Name & Organization | Position |
|---|---|---|
| 1. | Shri K. Gowrappan, Expert in the Assessment of Violation & Compensation<br>No. 6, Ganesh Avenue 2nd Street, Sakthi Nagar, Porur, Chennai, TN – 600 116 | Chairman |
| 2. | *Nominee of NEERI,* Expert in dealing with matter related to environmental damage cost assessment | Member |
| 3. | *Nominee of CPCB,* Expert in dealing with matter related to Environmental Compensation | Member |
| 4. | Dr Shruti Rai Bhardwaj, MoEF&CC | Member Secretary |

2. The Terms of Reference (ToR) of the above committee shall be as follows:



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i. To determine appropriate methodology for assessment of Environmental Compensation for loss/damage/degradation to environment, considering all relevant aspects of the matter.

ii. To ensure that the said methodology eliminates or at least negate the element of subjectivity in the matter of determination of Environmental Compensation.

iii. Wherever possible an empirical formula shall be developed for damage cost assessment covering both the direct and indirect liabilities for scenarios including the following;

a. Violation/ Non-compliance of conditions of Environment Clearance/ Consent to Establish (CTE) and/or Consent to Operate (CTO) under Air and Water Act resulting into damage to Environment
b. Violation/ Non-compliance of conditions of Environment Clearance/ Consent to Establish (CTE) and/or Consent to Operate (CTO) under Air and Water Act not resulting into any damage to Environment

iv. To evolve a mechanism which *inter-alia* is comprised of fixed penalty, assessment cost, environmental damage compensation cost and remediation/restoration cost for irreversible and reversible damages, in the overall Environmental/ecological Damage Cost Assessment.

v. To determine the approach for identifying direct and indirect liabilities for environmental damage compensation cost for different case scenarios and associated compensation methodology.

vi. Use of inflation index, exchange rate, purchasing power parity, site specific conditions while developing the formula for environment damage cost assessment.

vii. To develop a methodology for assessing 'abatement cost' that may be more than the maximum profit arising from violation to discourage violation/non-compliance.

viii. To utilize the concept of risk assessment which include risk to health and environment in setting remediation or restoration targets/levels.

ix. To develop compensation regime that acts as a deterrent to violators and incentivize compliant proponents.

x. To provide a simple approach of making assessment for damages particularly, when damage to environment is massive.

xi. Approach/appropriate action for giving the statutory status to the assessment of Environmental Compensation for loss/ damage/ degradation to environment.



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3. The committee may co-opt any expert as a member in a relevant field for particular meetings of the Committee with prior approval of the Ministry.

4. The Committee shall submit its report within four (4) months from the date of its constitution.

5. The tenure of the Committee shall be Six (6) months for finalization of the report.

6. **Reimbursement of TA/DA and Sitting fee-** Payment of TA/DA to the Chairman/members of the Committee/co-opted members for attending its meetings shall be governed as per the relevant government provisions under implementation in the Ministry.

This issues with the approval of the Competent Authority.

**(Dr. Shruti Rai Bhardwaj)**
**Addl. Director/Scientist 'E'**

Encl.: As above

To

(i) Shri K. Gowrappan, No. 6, Ganesh Avenue 2nd Street, Sakthi Nagar, Porur, Chennai, TN – 600 116
(ii) Director, National Environmental Engineering Research Institute, Nehru Marg, Nagpur 440020 (Maharashtra)
(iii) Chairman, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032

Copy for information to:

1. PS to Hon'ble Minister for Environment, Forest and Climate Change
2. PS to Hon'ble MoS (EF&CC)
3. PPS to Secretary (EF&CC)
4. PPS to DGF&SS (EF&CC)
5. PPS to AS (TK)/PPS to JS(SKB)



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**APPENDIX-II**

**File No. J-11013/40/2020.IA.I(M).Pt.1**
**Government of India**
**Ministry of Environment, Forest & Climate Change**
**Impact Assessment Division**
***

Indira Paryavaran Bhavan,
Jor Bagh Road, New Delhi-110 003
Dated: 1st December, 2022

**OFFICE MEMORANDUM**

**Sub:- Constitution of the Committee on Environmental Damage Cost Assessment in compliance with Hon'ble NGT Order dated 02.12.2021 in the matter of OA No. 175 of 2018 titled as Jammula Chhoudaraiah Vs Union of India & Ors.-reg.**

This is in continuation to the Ministry's Office Order of even number dated 22nd November 2022 in the matter of OA No. 175 of 2018 titled as Jammula Chhoudaraiah Vs Union of India & Ors. tagged along with other three matters vide which the Government of India in the Ministry of Environment, Forest and Climate Change has prescribed the constitution and Terms of Reference for the Expert Committee to determine appropriate methodology for assessment of Environmental Compensation for loss/damage/degradation to environment (copy enclosed). As prescribed in the Office Order, following are the nominees of CPCB and NEERI who will be member of the Committee:

1. Shri B. Vinod Babu, Scientist F & Director, CPCB, Parivesh Bhawan, East Arjun Nagar, Delhi-3. E-mail: bvbabu.cpcb@nic.in

2. Dr. Hemant B. Bherwani, Scientist, CTMD, CSIR-NEERI, Nehru Marg, Nagpur-440020. E-mail: h.bherwani@neeri.res.in

Other part of the Office Order dated 22nd November 2022 in reference to constitution, and terms and conditions will remain same for all the purposes.

This issues with the approval of the Competent Authority.

Encl: as above

**(Dr. Shruti Rai Bhardwaj)**
**Addl. Director/Scientist 'E'**

**To:**

(1) Shri B. Vinod Babu, Scientist F & Director, CPCB, Parivesh Bhawan, East Arjun Nagar, Delhi-3
(2) Dr. Hemant B. Bherwani, Scientist, CTMD, CSIR-NEERI, Nehru Marg, Nagpur-440020.

**Copy for information to:**

1. PS to Hon'ble Minister for Environment, Forest and Climate Change
2. PS to Hon'ble MoS (EF&CC)
3. PPS to Secretary (EF&CC)

4. PPS to DGF&SS (EF&CC)

5. PPS to AS (TK)/PPS to JS(SKB)

**F. No. IA-Z-11013/124/2022-IA-I**
Government of India
Ministry of Environment, Forest and Climate Change
(Compliance and Monitoring Division)

Indira Paryavaran Bhavan
Jor Bagh Road, Aliganj
New Delhi-110 003
Email: shruti.rai@nic.in

Dated: **11th March, 2024**

**Sub: Extension of the Tenure of Committee on Environmental Damage Cost Assessment (EDCA) Constituted in Compliance with Hon'ble NGT Order dated 02.12.2021 in the matter of O.A. No. 175 of 2018 and Appointment of new Chairman of EDCA- reg.**

This is in continuation to Ministry's Office Order of even number dated 22nd November, 2022 and 25th September 2023 regarding constitution and tenure extension, respectively of EDCA committee in the above cited court matter. Copy of both the Orders enclosed.

2. The tenure of the EDCA committee expired on 15th January, 2023. It was noted that there has been significant progress towards conclusion of the report considering that all the scenarios as applicable to EDCA for environmental non-compliance along with the associated formulas are near finalization except for some of the additional component of the report, which necessitate further extension of the committee.

3. Further, following the sudden demise of the Chairman of the Committee, Shri K Gowrappan on 21st January 2024, the proposal for the immediate nomination of a new Chairman was also taken up to complete the EDCA report finalization process. Dr. Satish R Wate, former Director of NEERI with wide expertise in the field of Environment Impacts Assessment (EIA) and related violation issues, was proposed as the alternate Chairman of the committee.

4. On the basis of detailed review of progress of the work assigned to the committee and considering the timeline associated with the associated court matter, as concurred by Integrated Finance Division (IFD) of the Ministry, following is approved:

i. Extension of the Environment Damage Cost Assessment (EDCA) Committee's tenure until 15th June 2024, with no alteration to the existing terms and conditions.

ii. Appointment of Dr. Satish R. Wate, former Director of NEERI, as new Chairman of the Committee.

5. **Reimbursement of TA/DA and Sitting fee**- Payment of TA/DA to the Chairman/members of the Committee/co-opted members, for attending its meetings

shall be governed as per relevant government provisions under implementation in the Ministry.

This is issued with the concurrence of IFD vide Comp. No. E-196143 dated 01st March, 2024 and approval of the competent authority.

**Dr. Shruti Rai Bhardwaj**
**Director/Scientist 'F'**

*Encl: As above*

**To**

1. Dr. Satish R Wate, 148/149, Nagar Vikas Society, Narendra Nagar, Nagpur-440015. Email: satishwate@gmail.com, sr.wate@neeri.res.in
2. Director, National Environmental Engineering Research Institute, Nehru Marg, Nagpur-440020 (Maharashtra)
3. Chairman, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.
4. Hemant Birwani, NEERI, Nehru Marg, Nagpur-440020 (Maharashtra)
5. Dr. Vinod Babu, CPCB, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.

**Copy for information to:**

1. PS to Hon'ble Minister for Environment, Forest and Climate Change
2. PS to Hon'ble MoS (EF&CC)
3. PPS to Secretary (EF&CC)
4. PPS to DGF&SS (EF&CC)
5. PPS to AS(TK)/PPS to JS(SKB)

**Dr. Shruti Rai Bhardwaj**
**Director/Scientist 'F'**