Final Document on Revised CEPI Version – 2016

Salient features and detailed methodology of revised CEPI concept :

Central Pollution Control Board (CPCB) in collaboration with Indian Institute of Technology (IIT), Delhi had carried out comprehensive environmental assessment of 88 prominent industrial clusters during 2009-10 based on Comprehensive Environmental Pollution Index (CEPI) criteria. CEPI is a rational number between 0 and 100, assigned to a given location to characterize the environmental quality following the algorithm of source, pathway and receptor. Out of identified 88 prominent industrial clusters, 43 industrial clusters in 16 States having CEPI score of 70 and above are identified as Critically Polluted Industrial Clusters. Further, 32 industrial clusters with CEPI scores between 60 & 70 are categorized as severely polluted areas. Thereafter, Ministry of Environment & Forests (Govt. of India) had imposed temporary moratorium vide O. M. 13.01.2010 on consideration of developmental projects in critically polluted industrial cluster/areas including the projects in pipeline for Environmental Clearance.

The present methodology on evaluation of CEPI score (as depicted in Figure 1) has been a matter of discussion at various occasions including during the national level conferences as well as regular meetings with SPCBs and following issues were realized:

- Factors B2, B3, C1 and C3 of the existing CEPI concept require reliable health impact studies on humans, flora and fauna.
- These health studies require huge funds and time consuming as well as complex due to difficulty in finding truly representative data.
- Existing criteria of assigning values based on news reports, magazines, journals, NGO studies, published literature etc. is many times debated by various stakeholders.
- Existing criteria also lacks clarity with respect to potentially affected population.
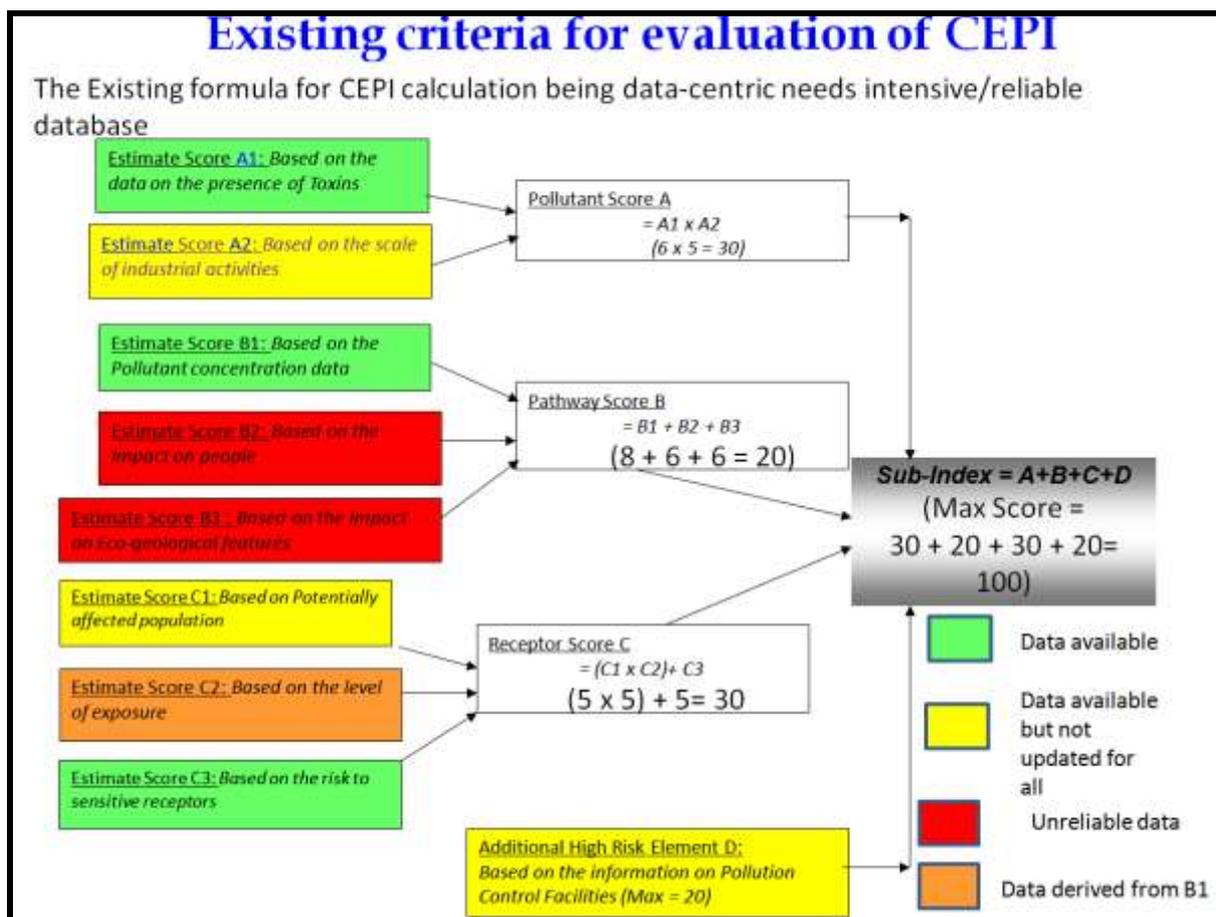
Figure 1: Existing criteria for evaluation of CEPI

Accordingly, to overcome the subjectivity, revised concept is proposed by eliminating the subjective factors as described in the previous section, but retaining the factors which can be measured precisely. The outlines of the revised CEPI criteria are as follows:

✓ Revised concept is prepared by eliminating the above debatable factors but retaining the factors which can be measured precisely.

✓ It is decided to develop the Comprehensive Environmental Pollution Index (CEPI) retaining the existing algorithm of Source, Pathway and Receptor.

✓ Health component was also retained in the revised concept in line with the suggestions of Secretary, MoEFCC during the meeting held in MoEF.

Outlines of revised CEPI criteria

The outlines of the revised CEPI criteria are as follows:

- ✓ It is proposed to develop the Comprehensive Environmental Pollution Index (CEPI) based on Sources of pollution , real time observed values of the pollutants in the ambient air, surface water and ground water in & around the industrial cluster and health related statistics.
- ✓ For assessment of the environmental quality of the area i.e. CEPI score, the concept of SNLF i.e. a surrogate number which represents the level of exposure (a function of percentage sample exceedence & Exceedence Factor) shall be used.
- ✓ Health component to be evaluated based on the health data available from major hospitals in the area was also retained in the revised concept.

Revised CEPI will comprise of following components:

Component	Weightage
Scale of industrial activity	20
Scale of exceedance of Environmental Quality (Level of exposure)	50
Health related statistics	10
Compliance status of industries	20
	100

The basic framework of the revised CEPI based on algorithm of Source, Pathway and Receptor, has been presented in Figure-2.
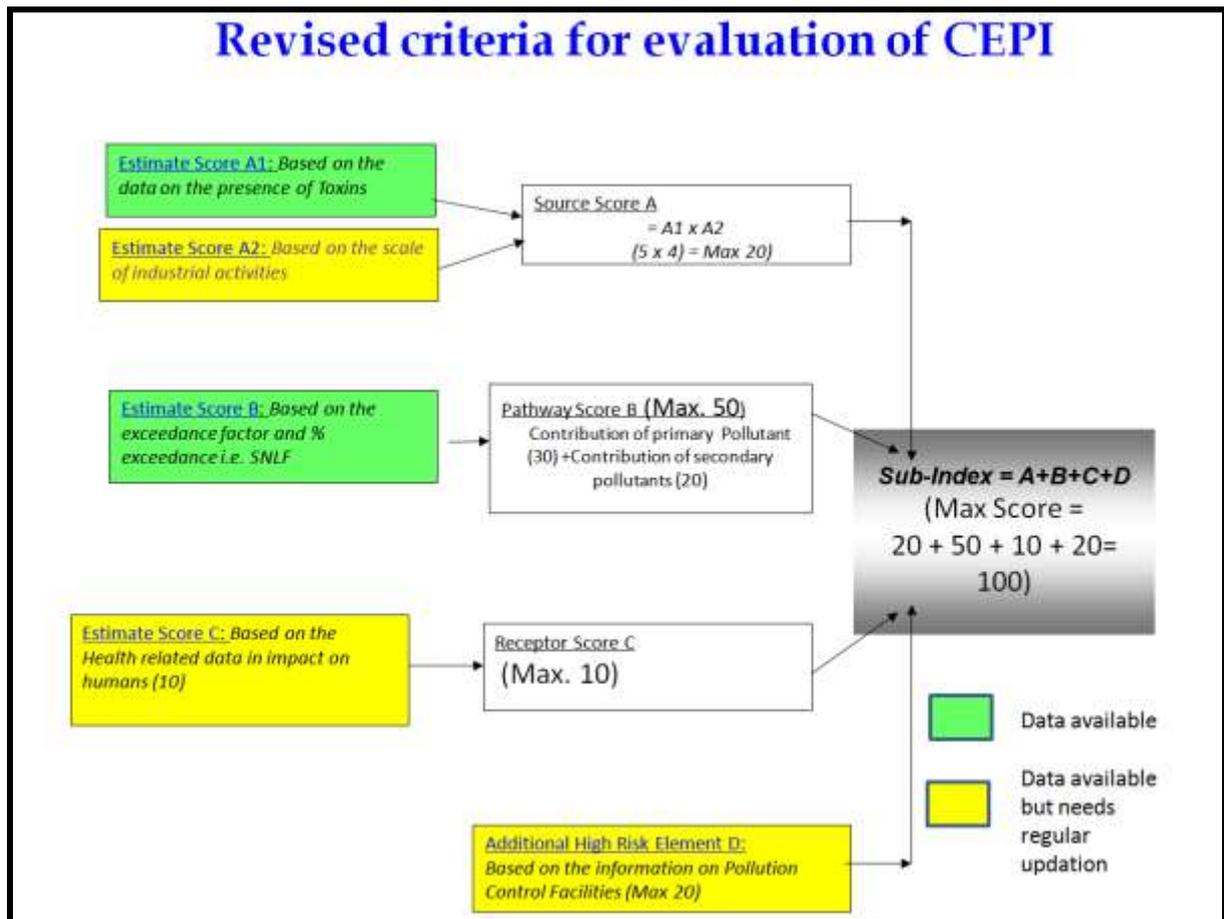
Figure-2 : Revised criteria for evaluation of CEPI

Salient features of revised CEPI criteria:

- Environmental Pollution Index (EPI) is a rational number to characterize the environmental quality of ambient Air/Surface Water /Ground Water of an Area.

- Air EPI, Surface Water EPI and Ground Water EPI will be calculated separately on a scale of 0-100.

- Overall CEPI will be evaluated using the existing formula, i.e.,

  CEPI = **i-max + [(100 – i-max) × (i2/100) × (i3/100)]**

  Where, i-max – maximum index (which may be either Air EPI or SW EPI or GW EPI); and i2, and i3 are indices for other media.

- Area for the purpose of CEPI study shall be notified by concerned SPCB as per the direction of CPCB.

- For each area, sampling protocol will be laid down by CPCB and the monitoring locations will be finalized by CPCB in consultation with concerned SPCBs.
- Guidelines for the use of CEPI will be notified by CPCB.
- Environmental quality monitoring shall be undertaken by concerned SPCBs on half-yearly basis and data will be placed in the public domain:

Season	Period of monitoring	Target date of Report submission
Pre-monsoon	April-June	31st July
Post-monsoon	Dec.-Feb.	31st March

- The monitoring data shall be analysed for the parameters exceeding the prescribed norms and time targeted remedial action plans be formulated by concerned SPCBs for the same.

Revised CEPI Evaluation Methodology

A: Source

- **Factor #A1 - Presence of Toxin**
  - Group A – Pollutants / chemicals that are not assessed as acute or systemic = 1
  - Group B – Organics / Pollutants / chemicals that are probable carcinogens (USEPA Class 2 and 3) or substances with some systemic toxicity. e.g. VOC's, PAHs, PCBs, air pollutants such as PM10 and PM2.5 = 2
  - Group C - Known carcinogens or chemicals with significant systemic or organ system toxicity. e.g. vinyl chloride, benzene, lead, radionuclide, hexa-chromium, cadmium, organophosphate pesticides. = 3

Selection of criteria pollutants :

Option 1: 3 pollutants relevant with the Area depending on the nature of industrial activity (preferable option/method)

Option 2: upto 3 most critical pollutants depending on the concentration and exceedance

- *Contribution of remaining two secondary pollutants will be based on the nature of the toxins as mentioned below:*

Group of toxicity of each of the Secondary Pollutants	Contribution Value for each of the pollutant
Group A	0.25
Group B	0.50
Group C	1.00

Max. Contribution of secondary pollutants=2.00

Max. score of A1=3+2 = 5

- **Factor #A2 – Scale of industrial activities**
  - Large = 4 (if there are
    - > 10 R17 per 10 sq km area or fraction OR
    - > 2 R17 + 10 R54 per 10 sq km area or fraction OR
    - > 100 R54 per 10 sq km area or fraction
  - Moderate = 2.5 (if there are
    - 2 to 10 R17 per 10 sq km area or fraction OR
    - 10-100 R54 per 10 sq km area or fraction
  - Limited = 1 (else there is any industry within 10 sq km area or fraction)

  SCORE A = A1 x A2 (max score = 5 x 4 = 20)

B: Pathway

Factor B- Level of exposure

A surrogate number which will represent Level of Exposure (SNLF) is calculated using % violation of ambient pollutant concentration, which is calculated as

SNLF = (No. of samples exceeded/ total no. of samples) x (Exceedance factor)

Range of SNLF	Category	Value
0 (For EF<0.75)	Low	0
0 (For 0.75<EF>0.8)	Low	1.5
0 (For 0.80<EF>0.85)	Low	3
0 (For 0.85<EF>0.9)	Low	4.5
0 (For 0.90<EF>0.95)	Low	6
0 (For 0.95<EF<1)	Low	7.5
<0.05	Moderate	8.25
0.05 to <0.1	Moderate	9
0.1 to <0.15	Moderate	9.75
0.15 to <0.2	Moderate	10.50
0.2 to <0.25	Moderate	11.25
0.25 to <0.30	Moderate	12
0.30 to <0.35	Moderate	12.75

0.35 to <0.4	Moderate	13.5
0.4 to <0.45	Moderate	14.25
0.45 to <0.5	Moderate	15
0.5 to <0.55	High	15.75
0.55 to <0.6	High	16.50
0.6 to <0.65	High	17.25
0.65 to <0.70	High	18.0
0.7 to <0.75	High	18.75
0.75 to <0.80	High	19.5
0.80 to <0.85	High	20.25
0.85 to <0.90	High	21.0
0.9 to <0.95	High	21.75
0.95 to <1	High	22.5
1.0 and above	Critical	30

Max. Contribution of primary pollutant=30

- Contribution of remaining two secondary pollutants will be based on their category of exceedance as mentioned below:

Level of SNLF of each of the Secondary Pollutants	Level of SNLF	Contribution Value for each of the secondary pollutants
0 (For EF<0.75)	Low	0
0 (For 0.75<EF>0.8)	Low	0.5
0 (For 0.80<EF>0.85)	Low	1
0 (For 0.85<EF>0.9)	Low	1.5
0 (For 0.90<EF>0.95)	Low	2
0 (For 0.95<EF<1)	Low	2.5
<0.05	Moderate	2.75
0.05 to <0.1	Moderate	3
0.1 to <0.15	Moderate	3.25
0.15 to <0.2	Moderate	3.50
0.2 to <0.25	Moderate	3.75
0.25 to <0.30	Moderate	4.0
0.30 to <0.35	Moderate	4.25
0.35 to <0.4	Moderate	4.5
0.4 to <0.45	Moderate	4.75
0.45 to <0.5	Moderate	5
0.5 to <0.55	High	5.25

0.55 to <0.6	High	5.50
0.6 to <0.65	High	5.75
0.65 to <0.70	High	6.0
0.7 to <0.75	High	6.25
0.75 to <0.80	High	6.50
0.80 to <0.85	High	6.75
0.85 to <0.90	High	7
0.9 to <0.95	High	7.25
0.95 to <1	High	7.5
1 and above	Critical	10

Max. Contribution of secondary pollutants=20

Maximum value of B = 30 + 20 =50

C : Receptor

Component C	
(Impact on Human Health)	
10	
Main - 10	
% increase in cases*	Marks
<5%	0
5-10%	5
>10%	10

- % increase is evaluated based on the total no. of cases recorded during two consecutive years.

- For Air Environment, total no. of cases related to Asthma, Bronchitis, Cancer, Acute respiratory infections etc. are to be considered.

- For surface water / ground water   Environment, cases related to Gastroenteritis, Diarrhea, renal (kidney)malfunction, cancer etc are to be considered.

- For the above evaluation, the previous 5 years records of 3-5 major hospitals of the area shall be considered.

d. Additional High Risk Element

Factor #D - Additional High Risk Element (Inadequacy of pollution control measures for large scale, medium and small scale industries and also due to unorganized sector). It is cumulative of ETPs, CETPs, Air Pollution Control Devises (APCDs) and unorganized waste disposal. Max. Score = 20

- If all the industries in the area have adequately designed/ operated and maintained pollution control facilities and also common facilities such as CETP/ FETP/ CHWDF are having adequate capacity and are having state of art technology = 0

- If all the large industries in the area have adequately designed/ operated and maintained pollution control facilities but small and medium industries are defaulting. Common facilities such as CETP/FETP/CHWDF are having adequate in capacity or operation/ maintenance = 5

- If all the industries in the area have adequately designed/ operated and maintained pollution control facilities but the common facilities

such as CETP/FETP/CHWDF are having inadequate in capacity or operation/ maintenance = 10

■ If all the large industries in the area have adequately designed/ operated and maintained pollution control facilities but small and medium industries are defaulting. Common facilities such as CETP/FETP/CHWDF are having inadequate in capacity or operation/ maintenance = 15

■ Inadequate Facilities of individual as well as common facilities, full penalty = 20

Table : Score for Additional High Risk Element: Factor D

S No.	Large Scale Industries	Small/ Medium Scale Industries	Common Facilities for Pollution Control	Score
1.	Adequate	Adequate	Adequate	0
2.	Adequate	Inadequate	Adequate	5
3.	Adequate	Adequate	Inadequate	10
4.	Adequate	Inadequate	Inadequate	15
5.	Inadequate	Inadequate	Inadequate	20

Inadequate Facilities: $\geq$ 10% units deficient in terms of design/ operation and maintenance of pollution control in case of small and medium scale industries

OR

$\geq$ 2% units deficiency in terms of design/ operation and maintenance of pollution control in case of Large scale industries or common facilities

The status report (last two years) shall be used for the purpose of deciding the score for adequacy.

Evaluation of the Ambient Air Index / Surface Water Index / Ground Water Index

After calculating A, B, C and D; calculate the sub index score (Air / Surface Water / Ground Water)   as:

Sub-Index Score = (A + B + C + D)

Sub index scores are to be calculated for each of the individual environmental components that is, Air Environment, Surface Water Environment, and Soil & Ground Water Environment separately.

Calculation of the Aggregated CEPI

The aggregated CEPI Score can be calculated as.

CEPI = i_m + {(100 - i_m)*(i_2/100)*(i_3/100)}
Where,
i_m: maximum sub index; and
i_2, and i_3 are sub indices for other media

The revised CEPI concept from now will be termed as Revised CEPI Version 2016.

Note :
- For all other remaining information / references / appendices unless otherwise stated herein above, the parent CPCB Document on CEPI titled as " Criteria for Comprehensive Environmental Assessment of Industrial Clusters (EIAS/4/2009-10)" shall be referred.

- This document is available on the website of CPCB at the following web-link : http://cpcb.nic.in/divisionsofheadoffice/ess/NewItem_151_Final_Book1.pdf .

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