



# [Baseline study for Strengthening of Knowledge Products' on Industrial Wastewater Management at National & State (Uttarakhand/Bihar) level to Combat Industrial Wastewater Pollution]

Stakeholder Consultation Workshop

Sustainable and Environment-friendly Industrial Production (SEIP) – II | 22.11.2019



Implemented by



Presented by  
National Productivity Council



# Content

- ❖ **Methodology & Approach for Gaps & Needs Assessment**
- ❖ **Feedback from Stakeholder meetings**
- ❖ **Key gaps and Needs identified**
- ❖ **List of Suggestions and Recommendations**
- ❖ **Elaboration of priority recommendations supported by International case examples**
- ❖ **Discussions**



# Methodology Adopted by NPC

1. Identification of varieties of knowledge products wrt industrial wastewater management

2. Mapping of stake holders and identifying various domains of industrial wastewater management

3. Exploration of KPs through secondary data collection, Primary data collection through visits, one-to-one meetings, group meetings etc

4. Categorization and inventorization of identified KPs and its evaluation by a standard evaluation criteria developed by NPC.

5. Questionnaire survey and analysis

6. Assessing requirement of type of KPs by respective stakeholders through responses, stakeholder workshops, persona meetings & internal brain storming

7. Assessment of gaps and need analysis based on survey responses and Interaction with several domain experts

8. Detail out suggestions/recommendations for new knowledge products required, ICT based tools that can be developed, modifications if needed for the existing knowledge products , approach for strengthening procedure etc

- Evaluation Criteria
- Questionnaire survey

# Identification / Mapping of stakeholders

Category / Range of Stakeholders in the domain of industrial wastewater management

| End users                  | Service provider          | Academia                   | Regulatory bodies | Consultant / Third party auditors                  | Investors                          | Publisher |
|----------------------------|---------------------------|----------------------------|-------------------|--|------------------------------------|-----------|
| Industry / ETP/ CETP       | Turnkey service providers | Professor / Teachers       | Judiciary / NGT   | MEP (Mechanical, engineering, Plumbing) Consultant | Financial institution / Banks      | Authors   |
| Plant Manager/ supervisor  | Technology providers      | PHD scholars / researchers | MoEF&CC           | Third party auditors                               | Government bodies                  | writers   |
| Plant operator/ technician | Equipment suppliers       | Institutes                 | CPCB / SPCB       | PMC (Project management) consultant                | Industrial development authorities | -         |
| Lab analyst                | O&M providing agency      | students                   | NMCG              | NGOs   | Industrial associations            | -         |

# Mapping of Various domains pertaining to industrial waste water management

**Matrix for types of Knowledge products or Knowledge inputs utilised or needed in industrial wastewater Treatment and Management Domains**

| S.no. | 1) Design / engineering / technology   | 2) Installation     | 3) Operation & maintenance                           | 4) Regulatory compliance                  | 5) Bid processing documents          |
|-------|--|---------------------|--|---|--------------------------------------|
| a)    | unit operations/ Pre treatment / Primary / secondary/ tertiary treatment / ZLD, equipment sizing/ design vetting / feasibility | Supply              | SOPs for each unit processes / equipment             | Statutory requirement / EIA/ EC/ CTE/ CTO | Contractual requirement              |
| b)    | Process engineering & bio kinetics, Sludge generation / management   | erection            | Trouble shooting / Prevention and control            | Discharge / Reuse standards               | Finances / Available funding schemes |
| c)    | Wastewater characterization and treatment process selection  | testing / trial run | Laboratory Sampling & Analysis / analytic procedures | Plant adequacy                            | Evaluation Process                   |

| S.no. | 1) Design / engineering / technology                                     | 2) Installation                        | 3) Operation & maintenance                                     | 4) Regulatory compliance                                   | 5) Bid processing documents           |
|-------|--|--|--|--|---------------------------------------|
| d)    | Conveyance / storm water drain/ piping network                           | Dry run / wet run                      | Accidental discharge plan                                      | Environment Laws / regulation / rules/ Govt. notification  | Life cycle assessment/cost assessment |
| e)    | Land & area requirement  | Pilot plant                            | Monitoring (Manual, online, real time, remote)/ Record keeping | certification & accreditation : MoEF / PCB/ NABL/ ISO etc. | Funding Model are EPC, BOOT, BOT etc. |
| f)    | Costing , capital cost & operating cost                                  | commissioning                          | Safety & Health Aspects  | -  | Investors                             |
| g)    | Retrofit / capacity augmentation / system upgradation                    | stablization                           | Best Practices / skill development                             | -  | -                                     |
| h)    | Pollution prevention and control at source / Resource recovery at source | List of service / technology providers | Energy conservation & efficiency                               | -  | -                                     |
| i)    | Reject management  | List of equipment providers            | List of chemical providers                                     | -  | -                                     |

# Key aspects of the standard evaluation criteria for evaluating KPs.

Details of the Knowledge Product

Indicative Range of Stakeholders Knowledge Product catering to

Objective / Purpose / Goal of the Knowledge Product

Content Quality & features with respect to Objectives & its scale

Content Gaps in Knowledge Product

Access / availability in public domain

Supporting Data / statistical insights presented via Tables / Diagrams

Utility Value: As per content of the Knowledge Product

Theoretical & practical strength of the Knowledge Product

SWOT Analysis of Knowledge Product

Any special features of the Knowledge Product in comparison with any other references

Specify requirement of new knowledge product

# **Generic Evaluation Criteria for Selected Knowledge Products in Wastewater Engineering and Management** **(Books / Handbooks / Guidelines / BAT / BREF etc)**

## **1. Name of Knowledge Product / Publisher / Year / Author / Country of Origin etc**

a. Handbook of Environmental Engineering, Volume 5: Advanced Physicochemical Treatment Technologies

b. Publisher – Humana Press, New Jersey

c. Author – Lawrence K. Wang, Yung-Tse Hung, Nazih K. Shammam

d. Country of Origin – USA

e. Year of Publication - 2007

**2. Indicative Range of Stakeholders Knowledge Product catering to** : Indicate stakeholders ( or Scale 1 limited to 5 Wide scale)

-undergraduate and graduate students (5)

-designers of water and wastewater treatment systems (4)

- scientists and researchers (5)



# SWOT Analysis

| Strength   | Weaknesses  |
|--|---|
| <ul style="list-style-type: none"><li>▪ Complete details of the advanced technologies, application, requirement and limitations are explained very well.</li><li>▪ The utility of this book is very vast considering the limited information available in public domain wrt advance treatment technologies.</li><li>▪ For better understanding, the handbook has given numerical examples, data tables and representative diagrams also.</li></ul>   | <ul style="list-style-type: none"><li>• The costing aspects of the technologies and the availability of these technologies are not elaborated.</li><li>• While all the advantages of the different technologies are elaborated, a comparison amongst these advance technologies highlighting the treatment efficiencies, availability, accessibility and costing is not given</li></ul>     |
| Opportunities  | Threats   |
| <ul style="list-style-type: none"><li>▪ The last updation of this book was in 2007 and it can be further updated.</li><li>▪ The worldwide technology providers of these advance technologies can be added along with its cost.</li><li>▪ The performance of technologies with changing effluent characteristics and climatic conditions should be added</li><li>▪ Troubleshooting during operation can be added in further editions.</li><li>▪ New data of success stories and achieved treatment efficiencies can also be added</li></ul> | <ul style="list-style-type: none"><li>▪ The conventional wastewater treatment technology are well proven and accepted all over the world. The acceptance to new and advance technologies is challenging.</li><li>▪ Advance technologies, are more scientific, energy efficient, are more robust and therefore have a higher capital expenditure unlike conventional technologies.</li></ul> |

## Information sought through questionnaire survey

Classification of Category of stakeholder wrt industrial wastewater management

Identification of domain of wastewater pertaining to them

Type of Knowledge product most commonly referred by the stakeholder

Utility of referred KP wrt to content user friendliness, comprehensiveness, adequacy and usefulness

Requirement of any new knowledge product by the stakeholder

Gaps / improvement required in the existing KPs referred by them

## Consultations Undertaken with

- CETP societies
- ETP owners/ managers
- Industries
- Regulatory bodies
- Technology providers
- O&M service providers
- Wastewater domain experts
- Academicians
- Consultants
- Investors

Stakeholder perspective on existing knowledge products being used by them

Identification of new knowledge products required in their respective domain

Undertaking a set of exercises for mapping of stakeholders in the wastewater sector

Elements to be explored via a well designed questionnaire

## Consultation undertaken

Identifying feasible approach for project execution

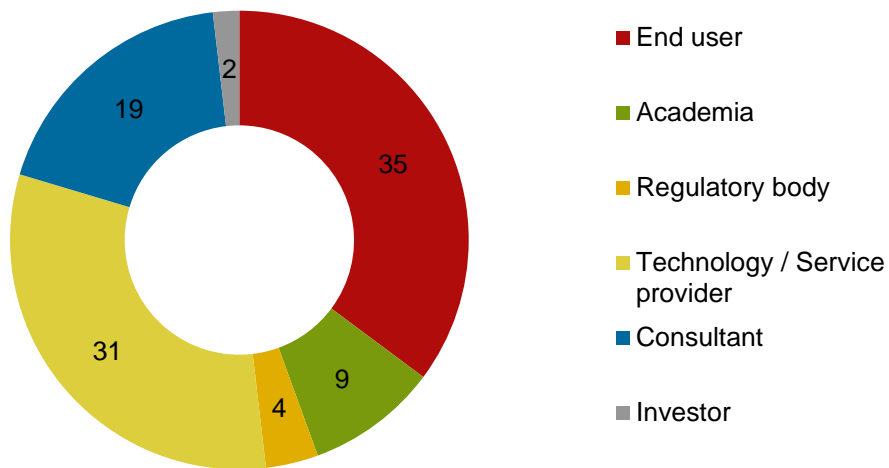
Identifying and listing stakeholders to reach and contact for inputs

To seek participants for enabling multiplier effect of the project

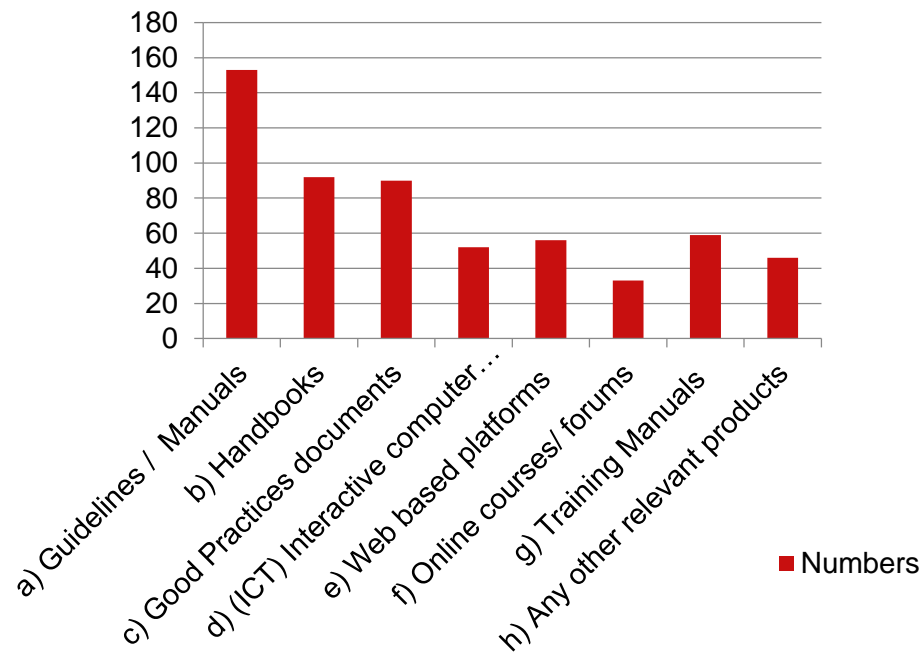
To receive periodic guidance

# Questionnaire Responses from 54 stakeholders & Comparative perspective on KPs referred

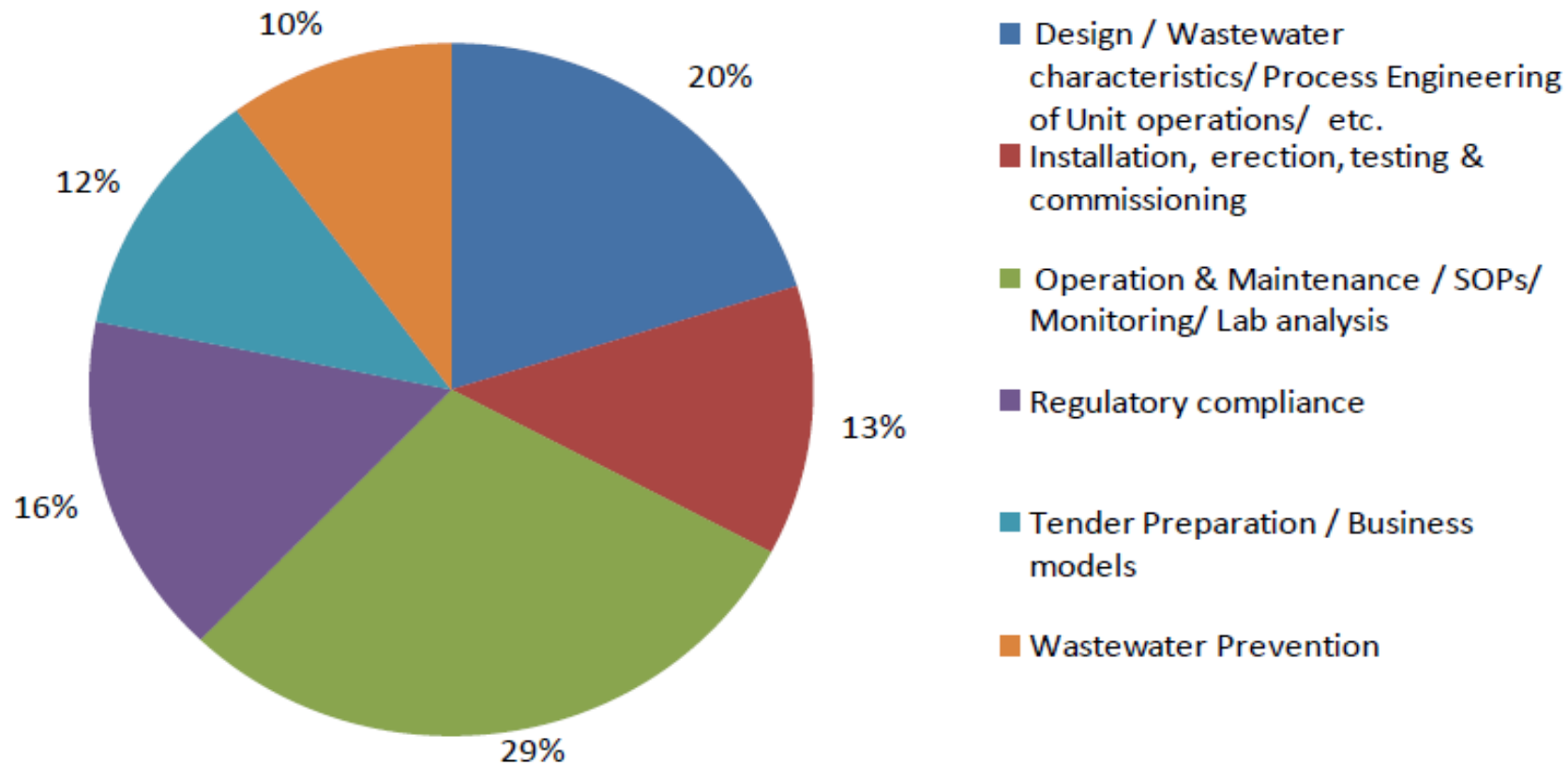
## % response from stakeholders



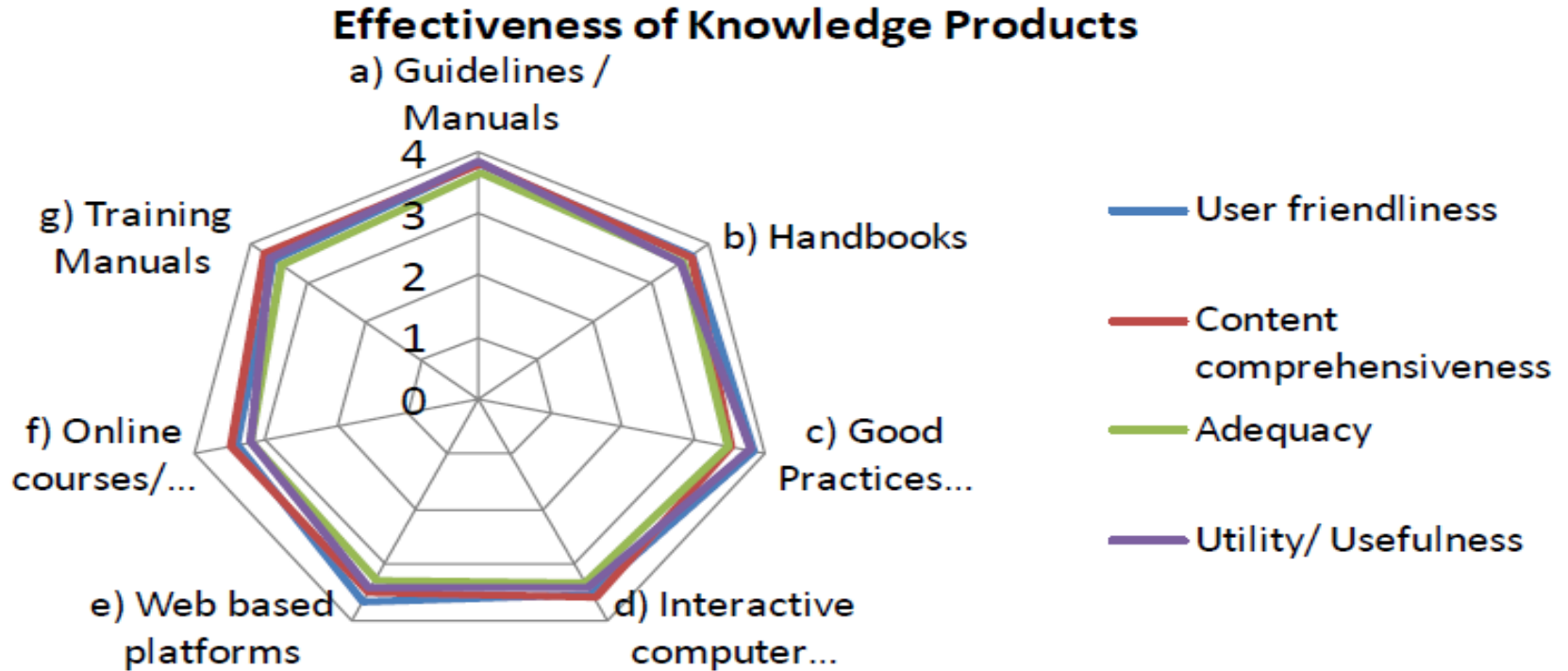
## Most commonly used KPs



**Distribution of clubbed Knowledge Products  
(Handbooks, Manuals, Guidelines etc) being accessed by responding  
stakeholders for various focus areas**

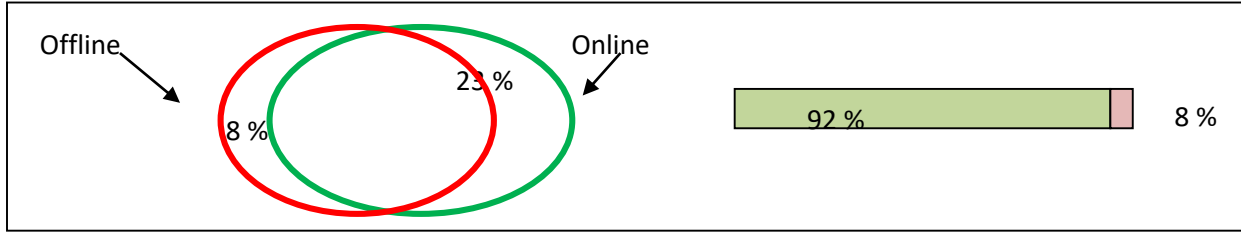


# Effectiveness of indicated commonly used KPs

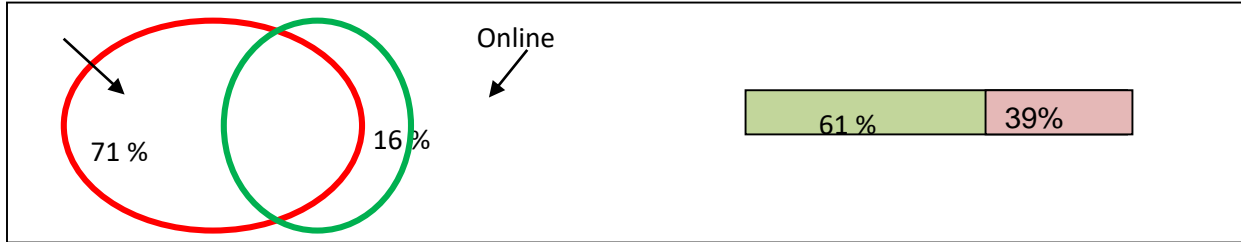


# Accessibility of indicative commonly used KPs

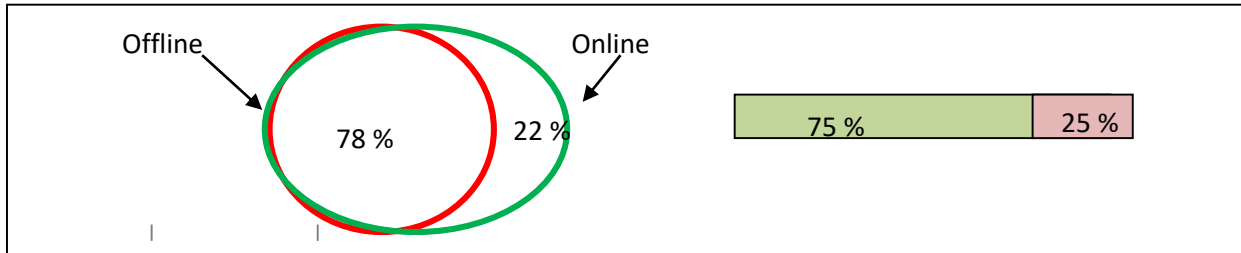
## 1.Guidelines/Manuals



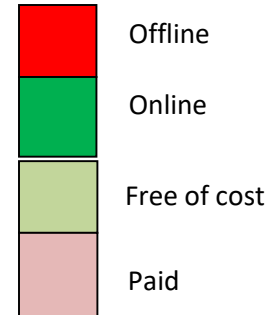
## 2.Handbooks



## 3.Good Practice Documents

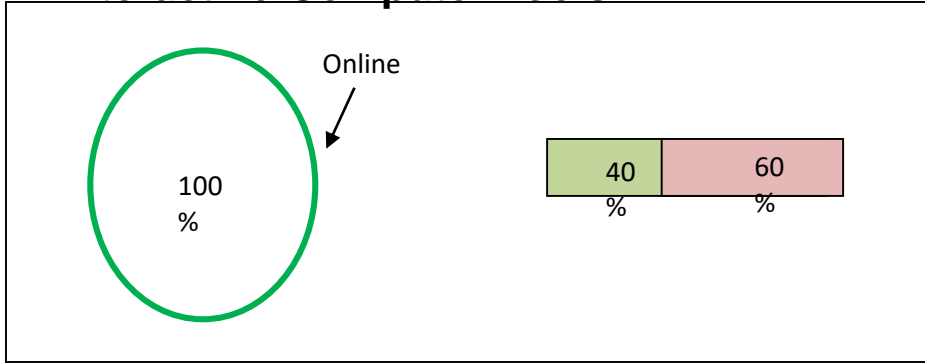


## Legends

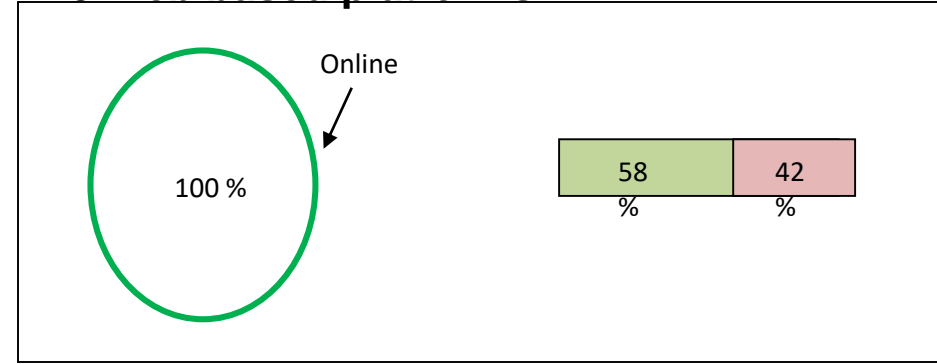


# Accessibility of indicative commonly used KPs

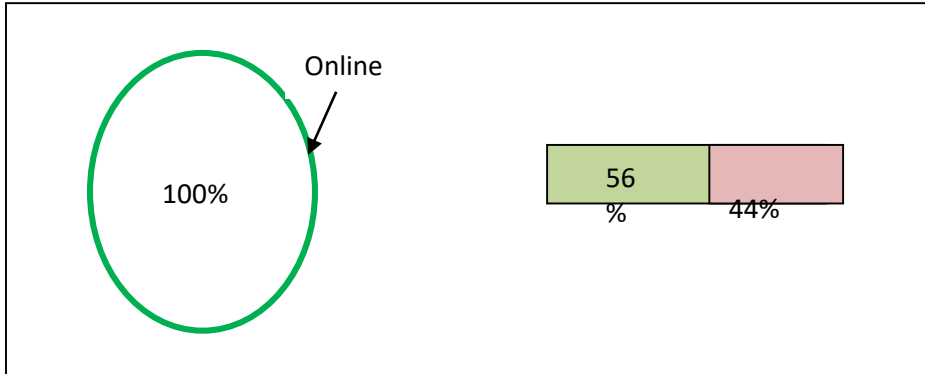
## 4. Interactive Computer Tools



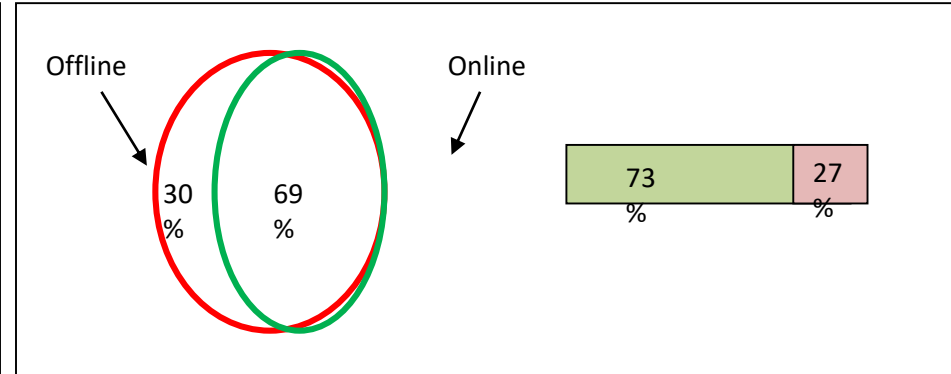
## 5. Web based platforms



## 6. Online Courses and forms



## 7. Training Manuals



Offline  
Online

Free of cost  
Paid



# Feedback from stakeholder meeting Dehradun on 22 October 2019

## Attended by:

Member Secretary (UEPPCB), officers of UEPPCB, representatives from PHD Chamber of commerce, CII, IIT, GIZ, Industry association, CETP operator etc.

## Feedback received:

1. Knowledge Products (KP) are significantly absent for **the treated wastewater usage** for agriculture use (especially specific to cropping pattern)
2. Scientific papers need to be published on wastewater usage/management
3. KP for Steel/automobile industries for air emission, water consumption, wastewater management etc. in factsheet form of 1-5 pages needed
4. The **factsheets** should be prioritized for about 10 sectors. The factsheet should be colour coded/series for better reference.

## 5. Studies and KPs on the following are also required:

- Profile of Industrial Area in state
- No. of Green, orange and red industries in the industrial area
- No. and profile of Industries near to river
- Best technology and practices in the world
- Do's & Don'ts for industries
- **Manual for regulatory bodies for field inspection**
- Analysis of industrial water requirement and waste water discharge in Uttarakhand region
- Prepare about 50 brochures (4 to 6 Pages) as case studies under the project
- **Booklet on ZLD, green belt, about CETP case studies, ACT like in Delhi CETP is required.**
- Instrumentation and monitoring requirements and good practices in the form of SOPs
- To launch Diploma courses on CETP/ETP for ITI's as other skill training is for 15 days or short duration

# Feedback from stakeholder meeting at New Delhi on 1<sup>st</sup> November 2019

## **Attended by:**

Senior Officials of CPCB, Representative from CETP operators, GIZ, Industry/ Industry association, Software developers, Consultants etc

## **Feedback received:**

It was discussed to refer to the following international KPs and come out with a similar requirement, if needed, in Indian context:

- Netherland KP on public health damage
- EU practical guide on quantifying harm in actions for damages
- EU Guidelines and standards for wastewater reuse
- EU Guidelines on Integrating Water Reuse into Water Planning and Management in the context of WFD (Water framework directive)

## **It was also suggested that new KPs are required for:**

- Guidelines for third party inspection and standard setting for industries.
- ICT tool or web based platform for monitoring progress or actions taken up by other Ministries in the domain of wastewater
- Self assessment tools for industries
- Web based platform for consolidated data for water consumption and wastewater generation by the industries
- National Web portal for all environmental laws pertaining to wastewater.

# Gaps identified in the existing KPs

## Gaps identified

- 1. Most KPs are on conventional technologies.**
2. Generally, KPs cater to operational level activities and design aspects are moderately treated
- 3. Very few KPs are contextualized to Indian situation**
4. A **key concept developed by regulator is ZLD but No Specialised Programme at Online Portal is available** to make effective implementation with respect to technology, costing etc.
5. KPs on combined WW treatment are very few
6. Good practice documents are mostly international and country specific and adaptation process need to be guided or India specific Best Practice Documents needed and with better access / ready availability
- 7. Inadequate / insufficient SOPs/Guidelines for Troubleshooting Problems with ETPs.**
8. Inadequate / insufficient Guidelines / Books for RO/FO & MEE Operations and Maintenance
9. Most KPs are aimed at aerobic treatment systems. Other types of treatment systems do not have much resources
10. KPs on combined wastewater treatment, design of packaged treatment systems, tertiary treatment of wastewater and its reuse, Troubleshooting of WWTP are required

# Gaps identified in the existing KPs (Contd.)

## Gaps identified

11. KPs specific or customized to various stakeholders needed

12. **Guidelines for vetting of design /installation of ETPs / CETPs needed etc.**

13. **State specific Guidelines and Suitable Act / Rules for CETPs establishment and User fee charges formulae and industry responsibility aspects, besides Business Models and funding pattern / O&M aspects related applicability issues are needed to be addressed and benchmarks for service life etc of Civil structures and Electro-Mechanical Equipment needed**

14. No common platform where design / features on WWTPs could be shared

15. User friendliness limited to already knowledgeable personnel

16. Simplified KPs and in Local language in respective States of India are not available.

17. **Sector specific model tender documents for design / development /installation of ETPs/CETPs with suitable detailing of technical requirements beyond treated wastewater discharge norms specifications as well are not available.**

# Benchmark international KPs in the form of ICT tools / web based platforms

| S.No. | Name   | Features  |
|-------|--|---|
| 1     | Toxic Release Inventory Program                          | A resource for learning about toxic chemical releases and pollution prevention activities reported by industrial and federal facilities   |
| 2     | Substance Registry Services                              | EPA's authoritative resource for information about chemicals, biological organisms and other substances tracked or regulated by EPA   |
| 3     | The Permit Compliance System                             | The permit compliance system (PCS) and integrated compliance information system (ICIS) databases provide information on companies which have been issued permits to discharge wastewater into rivers.   |
| 4     | European Pollutant Release and Transfer Register(E-PRTR) | A Europe-wide register that provides easily accessible key environmental data from industrial facilities in European Union Member States and in Iceland, Liechtenstein, Norway, Serbia and Switzerland. |
| 5     | EMAS   | A premium management instrument developed by the European Commission for companies and other organizations to evaluate, report and improve their environmental performance                              |
| 6     | eWater source  | eWater source, Australia's National Hydrological Modelling platform (NHMP)  |
| 7     | Burrlioz   | Standard software used to derive water quality guideline values for toxicants in Australia and New Zealand  |
| 8     | HowLeaky   | Water Balance Model developed to assess the impacts of different land uses, soil types, management practices and climates on hydrology and water quality.   |

# Benchmark international KPs in the form of Mobile Applications which can be developed in India

| S.No. | Name                                      | Features  |
|-------|---|---|
| 1.    | <b>Wastewater Inflow Calculator</b>       | This inflow calculator app makes it easy for the operator to estimate just how much the expected rainfall will impact their facility. Simply enter the drainage area in square feet and the rainfall amount in inches, and the app estimates the inflow into the sewer from rainfall in gallons.  |
| 2.    | <b>Leak Loss Calculator</b>               | Calculates the amount of water lost based on the size of the leak and the pressure of the main, making reporting easier.  |
| 3.    | <b>Sizing a Chemical Pump</b>             | Calculates the size of chemical pump needed for your specific application, depending on water flow, dosing requirements and strength of chemical needed.  |
| 4.    | <b>Well Disinfection</b>                  | Calculates the amount of chlorine bleach needed to disinfect a well.  |
| 5.    | <b>Percent Efficiency Calculator</b>      | On Simply entering the influent and effluent lab results for any parameter, including BOD and TSS, the calculator will determine how efficiently the process removed the parameter. Within seconds, wastewater specialists can calculate the efficiency of the wastewater treatment facility or any of the individual process within the plant. |
| 6.    | <b>Disinfection Calculations</b>          | Gives us an easy way for water professionals to calculate tank and pipe disinfection amounts. Simply insert tank or pipe sizes along with the desired ppm, and allow the app to calculate the chlorine dosage   |
| 7.    | <b>Well Drawdown</b>                      | Water professionals can simply enter the pressure readings from the air line installed with the submersible pump to determine well drawdown and specific capacity.  |
| 8.    | <b>Flushing Flows</b>                     | Estimating flushing flows has never been easier. This app helps estimate hydrant flushing and flushing devices made from pipe for various reasons when a gauge is not available and accurate calculations are not essential.  |
| 9.    | <b>Wastewater Infiltration Calculator</b> | Wastewater operators will find this tool invaluable for determining the amount of infiltration from various breaks and holes in the lines.  |

# Benchmark international KPs in the form of Mobile Applications which can be developed in India (contd..)

| S.No. | Name   | Features   |
|-------|--|--|
| 10.   | <b>Dosage Calculations for Water Treatment</b> | Water specialists can make on-the-spot calculations with this app. Various calculations allow you to make the necessary changes in treatment.  |
| 11.   | <b>OpCalc –Wastewater</b>                      | OpCalc is for Water/Waste Water field operators that need to perform calculations on the go, without an internet connection. This capability will help minimize error and maximize efficiency for calculation related tasks.   |
| 12.   | <b>Rural Water Calculator</b>                  | This calculator for the rural water community includes every formula and calculation needed for water and wastewater utility operators. Calculation categories include perimeter, area, volume, flow, detention, pressure, head, water loss and flow estimation, concentration, dosage, loading, temperature, weight, common conversions, horsepower, efficiency, F/M ratio, solids, wasting, sewer inflow estimation, chemical calculations, and process efficiency |
| 13.   | <b>AWWA Exam Prep.</b>                         | Pass your water operator certification exam with the <a href="#">American Water Works Association (AWWA)</a> Exam Prep study app. Study anywhere, anytime with 2,000+ practice questions and answers.  |
| 14.   | <b>Waste Water Reclamation Plant</b>           | A simple and easy-to-use utility that calculates mixed liquor suspended solids (MLSS), return activated sludge (RAS), and waste activated sludge (WAS) for those who work at water reclamation facilities.   |
| 15.   | <b>Env Calcs</b>                               | This app is designed for engineers, operators, and students to perform calculations such as pipe velocity, pipe diameter, friction head loss, mixer horse power, chemical consumption, chemical dose, residence time, blending concentration and much more. Feature allows users to select from imperial or metric unit system.  |
| 16.   | <b>Hydraulics and Waterworks Calc</b>          | Hydraulics Calculator contains 94 calculators and converters that can quickly, and easily, calculate and convert different hydraulics, water works, and civil engineering parameters.  |

# Benchmark international KPs in the form of Mobile Applications which can be developed in India

| S.No. | Name                                    | Features  |
|-------|---|---|
| 17.   | <b>Wateropolis</b>                      | Wateropolis is designed to provide fast and accurate results in any demanding situation. Download their 5 free formulas to have access to key formulas, convertors, and look-up tables. Users can use their email feature to share their results with their colleagues, co-workers, or to save for use later.   |
| 18.   | <b>PlutoCalc Water &amp; Wastewater</b> | Plutocalc is the most complete and popular problem solver suite for water treatment, wastewater, hydraulics, environmental chemistry, and unit conversions.   |
| 19.   | <b>Water Treatment Plant Process</b>    | This interactive app is designed to help students learn the properties of water, water treatment plants, water purification, water contamination, and sources of water in an innovative learning method.  |
| 20.   | <b>Wastewater Manager</b>               | Wastewater Manager app is designed for wastewater operators, engineers, or anyone else who has a need for easy-to-use mathematical formulas relating to wastewater. The formulas are organized by processes and can be used to assist in daily lab work, process troubleshooting, and more.   |
| 21.   | <b>Sewer Design Calculator</b>          | This app is designed for those involved in building or maintaining sewer infrastructure. The app uses “The Manning Equation” to calculate the necessary pipe diameter and slope for a given project. The user inputs the desired flow, length, initial ground elevation, and final ground elevation, and the app uses this data to calculate the slope, diameter, depth, and tractive force needed. The user has the option of working in U.S. units or SI units. |
| 22.   | <b>SAM-1 Smart Aqua Meter</b>           | This app turns smart devices into pH, oxidation-reduction potential (ORP), conductivity/ total dissolved solids (TDS), and temperature measuring meters that not only measure, but also communicate collected data via instant and error-free email.  |



# Need assessment of new KPs

| Need identified  | Who expressed the need                            |
|--|---|
| 1. Detailed Case studies on River pollution scenarios, pollution monitoring, river cleaning, rejuvenation and recovery / revitalization  | Regulatory body                                   |
| 2. Development <b>and advancing of India specific Water Quality Index</b> as a framework and methodology for implementation across regions covering surface and ground water regimes   | Regulatory body                                   |
| 3. Sustainable Portals / websites / Transportals etc., with deeper integration of possibly Artificial Intelligence application and Machine learning / data mining algorithms for comprehensively generating Technology options, addressing industry and stakeholder needs on specific range of wastewater management issues, addressing and providing end to end solutions via an open platform for bringing in multi-country inputs on technology options/guidance, reflecting India specific needs and indicators etc. The economics and relevance of such platforms should be driven by the beneficiaries and their business model structures | Domain expert                                     |
| 4. Self certification platforms for engineers and operators and wastewater professionals and availability of their databases for engagement by industry and regulatory bodies  | Industry  |
| 5. <b>Real time incidence response frameworks building</b> on online monitoring networks concerning wastewater related emergencies in the context of chemicals and toxics releases, pollutant load factors, floods and disaster impacts assessments and related recovery systems including mechanisms of strengthening additional real time data needs incorporation etc.  | Regulatory body / industry                        |
| 6. <b>Training module for induction of fresh appointees</b> with a Identified training Institute   | Regulatory body / designers/ technology providers |

# Need assessment of new KPs (contd.)

| Need identified  | Who expressed the need             |
|--|------------------------------------|
| 7. Costing elements and indexations with respect to design of ETPs / CETPs   | Designer / Investor                |
| 8. Comparison amongst alternatives based on site specific conditions (with range of conditions and parameters accounted for)   | Designer / Investor                |
| 9. Electromechanical detailing and equipment descriptions and alternatives   | Designer / Academician             |
| 10. <b>O&amp;M Manuals and worksheets and usage</b> features   | End User (Industry/ CETP/ETP)      |
| 11. <b>Models with respect to revenue and cost benefits</b> (enterprise / society level)   | Bidder/ Investor                   |
| 12. Sector specific features / key differentiators or focus elements highlighting unit specific and cluster specific treatment approaches, design and outcomes   | Designer / consultant/ Academician |
| 13. <b>EIA requirements / Environmental Clearance aspects and modeling, including for river and sea water discharges of treated effluents</b>  | Regulatory body / consultant       |
| 14. Solved numericals and Question / Answer banks for designers of different stages of knowledge building  | Designer / Academician             |
| 15. Case examples and case studies focused KPs : (regarding successes / failures / upgrades and redesign and also covering tendering elements and cross references) .  | End User (Industry/ CETP/ETP)      |
| 17. Industry / Sector specific KPs and guidelines are required. Sector specific features / key differentiators or focus elements highlighting unit specific and cluster specific treatment approaches, design and outcomes | End User (Industry/ CETP/ETP)      |
| 18. <b>Advanced Treatment Focused Manuals ( e.g electro chemical treatment processes, thermal desalination, FDB etc )</b>  | Designer / End user                |

# Need assessment of new KPs (contd..)

| Need identified  | Who expressed the need                  |
|--|---|
| 19. Establishment of Pilot Plants and Demonstration Units for different technologies in WWT and Training Plans related KPs   | Academician/ consultant                 |
| 20. Softwares required for the range of the domain (e.g. for drainage there is WaterCad / Watergem / SewerCadetc being made by Bentley but access is inadequate and very few trainers in this domain).   | Technology provider                     |
| <b>21. RO/FO/MEE Operation and troubleshooting</b>   | Technology provider / End user          |
| 22. Standards Development (Linking to Output 1 – Legislative or norms perspectives) and Load based standards   | Regulatory Body / End user              |
| 23. Guidelines towards prevention and control and detailing water auditing procedures  | Regulatory Body / End user / consultant |
| <b>24. Energy efficient Treatment Systems</b>  | Designer / Technology provider          |
| 25. Specific treatments like Ammonia removal, Cyanide removal, heavy metals removal: Standardized Methods needed.  | End user                                |
| 25. Utilization of Solar power in effluent / sludge treatment  | Academician/ consultant                 |
| 26. <b>Comprehensive Water Quality Index</b> integrating various parameters (to also include linkage with GIS systems and geo – referencing and GIS based Governance) or Geo-Mapping on different parameters (by Physical monitoring for surface and ground water as well as Satellite imagery e.g. for Rivers ) | Regulatory Body / End user / consultant |
| <b>27. Heavy Metal Pollution Index Development related KP</b>  | Regulatory Body                         |

# Measures Suggested & recommended for strengthening of knowledge products

## Existing Knowledge Product

- To maximize the outreach of knowledge products , **digitization of all the knowledge products** may be a good alternative
- Web based centralized database can be created for all the existing and upcoming KPs wrt industrial wastewater management
- The KPs can be classified under various identified domains of industrial wastewater management.
- The centralized database may have the provision of membership fee (one time / annual) for accessing all the KPs and eventually making it sustainable.
- Strengthen the various law portals by creating a National Law portal for all compiled rules, regulations, gazette notifications, standards, compliance requirements, penalties

## New Knowledge Product

- Advanced portal for water quality data analysis
- A **networking portal** for all stakeholders may be developed for knowledge and experience sharing amongst all wrt to pollution prevention / mitigation, trouble shooting of wastewater treatment plants etc.
- Create web based platform for **data integration and correlation of progress / initiatives made by various ministries / bodies**
- **Create mobile applications for all utility based knowledge products**, eg O&M/ SOPs/ online monitoring/ designing/ calculations/ audit procedures

# Priority list of KPs to be Strengthened / Developed for Indian Scenario

## Strengthening of:

1. Existing web based portal **ENVIS** for compiled database of all existing knowledge products
2. Existing water quality portal – **India WRIS** by Ministry of Jal Shakti. Incorporating water quality data from industries and provision for data analysis / interpretation / integration

## Development of:

| S.No | Knowledge product to be developed on  | Format                         | International Benchmark KP  |
|------|---|--------------------------------|---|
| 3    | Field inspection guideline/ checklist for regulatory bodies   | Guideline / mobile application | -   |
| 4    | Guidelines for online monitoring mechanism (CPCB guide exists, published in July 2018) and focused on instrumentation | ICT                            | Review of process and performance monitoring techniques applicable to large and small scale wastewater recycling systems, Australia |
| 5    | Operation , maintenance, trouble shooting and monitoring of wastewater treatment plants / sludge management           | Manual / mobile application    | QR Code , Germany   |
| 6    | Imperial approach / calculation to calculate the extent of damage caused by pollution                                 | Manual                         | Practical guide of quantifying harm / public damage , European commission & Netherlands   |
| 7    | Treated water / process reject water reuse applications bases on its quality  | Guideline /mobile application  | Minimum quality requirements for reused water in the EU   |
| 8    | Online course/ training material for wastewater professionals   | Online course /ICT             | IHE Delft, Institute for Water Education Netherlands  |

## 1. Knowledge portal – ENVIS

- Environmental Information System on providing environmental information to decision makers, policy planners, scientists and engineers, research workers, etc
- ENVIS has comprehensive network & has been designed as the National Focal Point (NFP) for INFOTERRA, a global environmental information network of UNEP.
- this platform can be utilized for larger dissemination of existing knowledge products.
- Provision for feedback on any KP may also be considered.

## 2. Water quality portal – India WRIS

- Exhaustive data available with respect to water quality of surface water, ground water, river basins etc.
- Data of industrial water consumption, wastewater generation can also be added
- Data of water harvested by various means can be added
- Provision for data analysis, interpretation and integration may be looked into.



### 3. KP on field inspection guideline/ checklist for regulatory bodies

➤ **Guideline / mobile application** on field inspection of wastewater treatment plants by regulatory bodies, where in you can feed the data during inspection and instant report will be generated . The checklist to include aspects like:

1. Details of the plant – ETP/ CETP, capacity , Technology, design considerations, type of effluent it is catering to etc.
2. Performance – Capacity utilization, inflow v/s outflow, inlet / treated effluent characteristics as per last available records, performance of unit operations
3. Control of operational parameters (pH, DO, F/M, SVI,  $\Delta P$  across filters, sludge recirculation ratios etc. )
4. Records / log books to be checked and values to be recorded
5. Sludge management – Quantity, characteristics, storage and disposal mechanism

**The field inspection report will be instantly generated and the sampling and analysis values will subsequently validate the report.**

## 4. KP on guidelines for online monitoring mechanism

➤ Guideline and **ICT tool** for online monitoring mechanism to include:

1. Data intake which is **Complete, reliable and authentic**
2. Parameters that should be online monitored, co-relating parameters like Ph value to be recorded along with temperature
3. Details of instrumentation, eg. Type of sensors / analyzers/ camera to be used, limitations of sensors
4. calibration of instruments / calibration frequency
5. operational parameters to be recorded during online monitoring
6. Trend analysis, Red alert for any failure





## 5. KP on Operation , Maintenance, Trouble Shooting and Monitoring of wastewater treatment plants

➤ Comprehensive Manual/ mobile application on O&M, Trouble shooting and monitoring of wastewater treatment plants including all aspects of:

1. SOPs of all unit operations / equipments including the schedules of preventive maintenance schedules & corrective maintenance measures
2. Operational control parameters (pH, DO, F/M, SVI,  $\Delta P$  across filters, sludge recirculation ratios etc. )for achieving the treatment efficiencies
3. Improving energy efficiency of the overall plant
4. Details of dosage of chemicals, coagulant / flocculent to be added wrt wastewater characteristics subject to actual treatability studies
5. **Guideline for sludge management, quantity , characteristics, parameters to be analysed, disposal procedure and norms**
6. Trouble shooting of unit operations / equipments during operational failures, system revival after breakdowns, re-commissioning of plant and its stabilization etc..
7. Record keeping details (online/ offline ), accident reporting, data to be monitored, frequency of sampling, SOPs to be followed for analysis
8. Details of physical, online and real time monitoring

## 6. KP on empirical approach / algorithm to calculate the extent of damage caused by pollution

➤ Manual to calculate the extent of public damage to include aspects like::

1. Methods for establishing infringement and non infringement scenario
2. Techniques for estimating the price or other economic variable in the non- infringement
3. Simulation models, cost / finance based methods of analysis
4. Quantifying the harm caused by volume effect
5. Quantifying harm and compensation aspects



## 7. KP on treated wastewater / process reject water reuse applications based on its quality

➤ Guideline / software / mobile application , where in values of treated waste water characteristics shall indicate its suitability for reuse in primary / secondary applications like:

1. Landscaping / horticulture / agricultural usage specific to cropping pattern
2. Process water in industries
3. Flushing water in water closets
4. Cooling tower make up water
5. Floor washing

➤ Extent of improvement/ further polishing required to a specific type of treated water to enable its utility in various applications

## 8. KP on online course/ training material for wastewater professionals

### Online Skills Course on Wastewater Treatment for Technicians of ETPs/CETPs

|                      |   |
|----------------------|---|
| <b>Objective</b>     | Online training system for skills development of the technicians and operators of the industrial wastewater treatment plants  |
| <b>Scope</b>         | <ul style="list-style-type: none"><li>• Online course to be certified by NSDC/SCGJ</li><li>• Includes lectures, videos, interactive learning tools, quiz, practical work</li><li>• Certificate of qualification on passing the SCGJ examination</li></ul>   |
| <b>Benefits</b>      | <ul style="list-style-type: none"><li>• Flexible and adaptable modules customised to different categories of technicians (RPL, Full scale modules)</li><li>• No need to be absent from the workplace</li><li>• Industries can employ trained manpower or upgrade the skills of the existing staff</li><li>• Helps improve operations of ETPs/CETPs and reduce pollution</li></ul> |
| <b>Beneficiaries</b> | <ul style="list-style-type: none"><li>• Over 1,30,000 technicians and operators of ETPs/CETPs</li></ul>   |
| <b>Development</b>   | Proposed to be developed locally with technical support from a German Expert  |
| <b>O&amp;M</b>       | To be operated by SCGJ  |

# Resource Efficiency & Sustainable Consumption & Production – Output 5 SEIP II

## Knowledge products already developed or existed:

- COINDS (Comprehensive industry document series, 54 sectors; such as stone crusher, ceramics, cement, POP, hot mix, pickling, small paint, brewery etc.) – CPCB with supporting institutions including NPC
- E textile toolbox (UNIDO / Veitnam cleaner production center/ India NCPC)
- Manuals on synthetic textile, pesticide formulation, agro based pulp& paper (UNIDO & NPC under DeSIRE project)
- Promoting resource efficiency in Small & medium enterprises (PRE-SME) toolkit (UNEP)
- Cleaner production toolkit (UNIDO)
- Waste minimization case studies compendium (MoEF&CC / NPC)
- Booklet on waste minimization circle project and training manual (MoEF&CC / NPC)
- WMC newsletter series (MoEF&CC / NPC)
- Green productivity demonstration project reports (APO / NPC) in Dye & dye intermediate sector, edible oil sector etc.
- Green product innovation incubator (UNIDO) and case studies
- Lean manufacturing programme case studies – MSME/ NPC

# Resource Efficiency & Sustainable Consumption & Production – Output 5 SEIP II

## **New Knowledge products needed:**

- upgraded / revised COINDS for 54 sectors and for new sectors
- Electronic toolboxes (combination of existing research papers, project initiatives, success stories etc.) for a wide range of sectors
- Ecolabeling framework and harmonized database for India and other countries
- Eco product database (country wise, product wise, sector wise)
- Green finance for SCP and its framework, schemes, incentives, standard RFPs etc.
- Policy compendium on SCP (National & international)
- Sectoral case studies and comparative insights on benchmarks for resource efficiency
- Circular economy framework and related projects and schemes and MFCA (material flow cost accounting) initiatives and Green lean programme
- SCP related awards (criteria, past assessments and insights)
- SCP related research calls, frameworks and design components



# Thank You !

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