

**Centre for Science and Environment**



**A Report on Survey of**

# **IMPLEMENTATION OF CONTINUOUS EMISSION MONITORING SYSTEM IN INDIA**

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## Acknowledgement

The report is based on the survey of implementation of Continuous Emission Monitoring System carried in two states- Madhya Pradesh and Karnataka. Centre for Science and Environment (CSE) in collaboration with Madhya Pradesh Pollution Control Board (MPPCB) and Karnataka State Pollution Control Board (KSPCB) carried the survey in respective states. CSE is thankful to MPPCB and KSPCB for extending their support and cooperation in this survey. We hope that the report will help to push CEMS implementation in the right direction.

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## Background

The Continuous Emission Monitoring System (CEMS) or real time pollution monitoring is an important initiative taken by the Ministry of Environment, Forest and Climate Change (MoEF&CC) and Central Pollution Control Board (CPCB) in order to strengthen pollution control regime in India. The initiative took off with a direction issued by CPCB (vide letter no. B-29016/04/06PCI-1/5401 dated 05.02.2014) which mandated installation of real-time monitoring of air emission and effluent quality mandatory for 17 categories of highly polluting industries and common pollution treatment facilities such as Common Effluent Treatment plants, Common bio-medical treatment facility, Common hazardous waste treatment facilities, Municipal solid waste treatment facilities etc. In two years of time from the date of direction, nearly 80 per cent of 2,700 industries had installed the CEMS. However, the installation of CEMS alone couldn't bring any significant improvement in pollution monitoring & reporting and compliance status of industries. The draft notification issued by MoEF&CC in April 2015, also had to be put on hold. Lack of basic infrastructure and inadequate strategy was seen a big hurdle.

Centre for Science and Environment (CSE) firmly believes that CEMS is a potential tool to revive the environmental regime of India, therefore, supports this initiative. It is working closely with CPCB, State Pollution Control Boards (SPCBs), technology suppliers, industries and service providers to help successful implementation of CEMS in India. To understand the present status, challenges and suggest strategy for successful implementation, CSE had interacted with wide range of stakeholders and carried site visits. It also organized number of roundtables, meetings and conferences to disseminate information and discuss the way forward. CEMS implementation survey is one important step in this direction taken by CSE, to understand the ground reality and achievement of the initiative so far.

## Concept of survey

The survey was intended to understand the progress of CEMS installation in India and initiatives need to be taken ahead. More than two and half years have passed since the direction for installation was issued, still implementation is a challenge. Except a few states where additional initiatives were taken, majority of states have been struggling to implement. Specifically, challenges in medium and smaller industries are complex compared to larger players. Issues in implementation include technology selection, installation, regular operation & maintenance, data transmission, inspection and compliance check. To understand the reality on the ground, a survey of sample comprising various types of industries from more than one state was planned to be carried. CSE joined hands with SPCBs- Karnataka state Pollution Control Board (KSPCB) and Madhya Pradesh Pollution Control Board (MPPCB) in Karnataka and Madhya Pradesh

respectively to carry CEMS implementation survey. The survey was carried out between June to August 2016.

### **Objective of survey**

The objective of the survey was to comprehend the situation of CEMS implementation in various types and sizes of industries in both the states and to plan accordingly for better implementation. To understand the reality at ground, each and every industry was visited, relevant officials from SPCBs and industries were interviewed and discussions were carried to understand the solution oriented perspective. Further plan is to work with SPCBs to help in proper implementation of CEMS in their states.

The survey assessed information on following points:

- Status of CEMS installation and compliance to the direction.
- Operational status- consistency in data monitoring, regular maintenance and data reporting.
- Knowledge on real time monitoring system in industries and regulators (working of the technology, equipment, regular maintenance like calibration, drift/span check, frequency of calibration and certification of equipments)
- Skilled manpower and infrastructure availability among industries and regulators.
- Inclination of industries and regulators towards CEMS implementation.

### **Survey procedure**

CSE engaged with KSPCB and MPPCB to carry survey of CEMS implementation in the respective states. The plants where CEMS was officially installed were surveyed.

#### **Modality**

A representative sample of around 20-25 plants, including larger and smaller ones, across key sectors- power, cement, refinery, steel, paper, textile and distillery etc. where real time monitoring was mandated were chosen for the survey. To collect information, a brief questionnaire was prepared which was shared with plants to collect required information. The survey was covered in 1-2 visits, each for 3-5 days.

#### **Survey Team**

The survey was carried out by the Environmental Governance-Industry Team of CSE. The CSE team comprises of Mr. Sanjeev K. Kanchan, Programme Manager and Ms. Kanika Bahel,

Research Associate. The CSE representative(s) were accompanied by a local SPCB official(s) appointed by respective board during the visits.

### Support and Interaction from SPCB

The survey was carried out as a collaborative work between CSE and SPCBs. Both KSPCB and MPPCB have extended their full support for the survey in their respective states. Meetings were conducted with the concerned SPCB official(s) to identify the industries which have installed real time monitoring systems and could be visited for the survey. The interactions with SPCBs highlighted that the present target of the boards is to get all the industries to install real time monitoring equipments and collect real time monitored pollution data. Currently, the data being collected is not used for compliance check.

### Industries surveyed

A total of 22 industries were visited (Table: 1) for the survey, including 8 industries from Karnataka and 14 from Madhya Pradesh. Industries visited include larger and smaller units across various sectors like pharmaceuticals, power, distillery etc.

**Table 1:** List of industries surveyed in states of Madhya Pradesh and Karnataka

S.No	Name	Industry Type	Location	State
1	Grasim Industries Ltd.	Chlor-alkali	Nagda, Ujjain	Madhya Pradesh
2	Kedia Great Galleon	Distillery	Badnawar, Dhar	Madhya Pradesh
3	Associated Alcohols & Breweries Ltd.	Distillery	Barwaha, Khargone	Madhya Pradesh
4	Agrawal Distilleries Ltd.	Distillery	Barwaha, Khargone	Madhya Pradesh
5	Som Distilleries	Distillery	Sehatganj, Raisen	Madhya Pradesh
6	Navin Chemical & Fertilizers	Dye & Dye intermediates	Dewas	Madhya Pradesh
7	Khaitan Chemical & Fertilizers	Fertilizer	Nimrani, Khargone	Madhya Pradesh
8	Unichem Laboratories	Pharmaceutical	Pithampur, Dhar	Madhya Pradesh
9	Symbiotech Pharma	Pharmaceutical	Pithampur, Dhar	Madhya Pradesh
10	Lupin Laboratories	Pharmaceutical	Mandideep, Raisen	Madhya Pradesh
11	Vardhman Yarns	Textile	Satlapur, Raisen	Madhya Pradesh
12	Hindustan Electro Graphite	Thermal Power	Mandideep, Raisen	Madhya Pradesh
13	Vardhman Yarns	Thermal Power	Satlapur, Raisen	Madhya Pradesh
14	M.P. Waste Management Project	Treatment, Storage, Disposal Facility	Pithampur, Dhar	Madhya Pradesh
15	Medicare Environmental Management Pvt. Ltd.	Bio Medical Waste Incinerator	Nelamangala Taluk, Bangalore Rural	Karnataka
16	Heidelberg Cement India Ltd.	Cement	Ammasandra, Tumkur	Karnataka
17	Lake Chemicals Pvt. Ltd.	Chemical	Bommasandra,	Karnataka
18	Pai Pai Chemicals Pvt. Ltd.	Chemical	Kengri Hobli, Bangalore	Karnataka

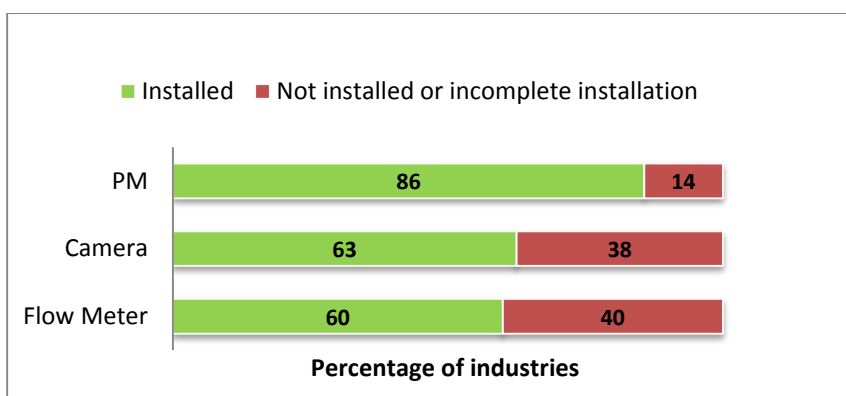
19	J. P. Group	Distillery	Taluk, Tumkur	Karnataka
20	CIPLA Limited	Pharmaceutical	Bommasandra	Karnataka
21	JSW Steel	Steel	Bellary	Karnataka
22	JSW Energy	Thermal Power	Bellary	Karnataka

## Findings

### 1. Status of installation and operation

According to the data available with SPCBs, out of the 121 industries in Madhya Pradesh where CEMS was supposed to be installed, nearly 65% of industries have installed while in Karnataka, 80% of 182 industries have installed the real time monitoring system till date. Industries being from different sectors, the requirements of parameters for which continuous monitoring were to be installed were different. Apart from 17 categories of industries, MPPCB has also directed some grossly polluting industries including textile, dairy and slaughter house to install real time monitoring system. Among the total 22 industries in both the states, 14 required real-time monitoring for PM while 10 required for gaseous emissions. For effluent, 7 required for real-time effluent monitoring, 16 claiming zero liquid discharge (ZLD) required a camera while 20 required a flow meter.

**Installation status:** Survey found that nearly 40% of the industries had not installed a camera and a flow meter while nearly 15% not completed installation of continuous PM monitor. All the industries that required continuous monitors for gaseous emissions and effluents have installed the required equipments. Among those have installed, 15% of the equipments were not working due to failure of some equipments.



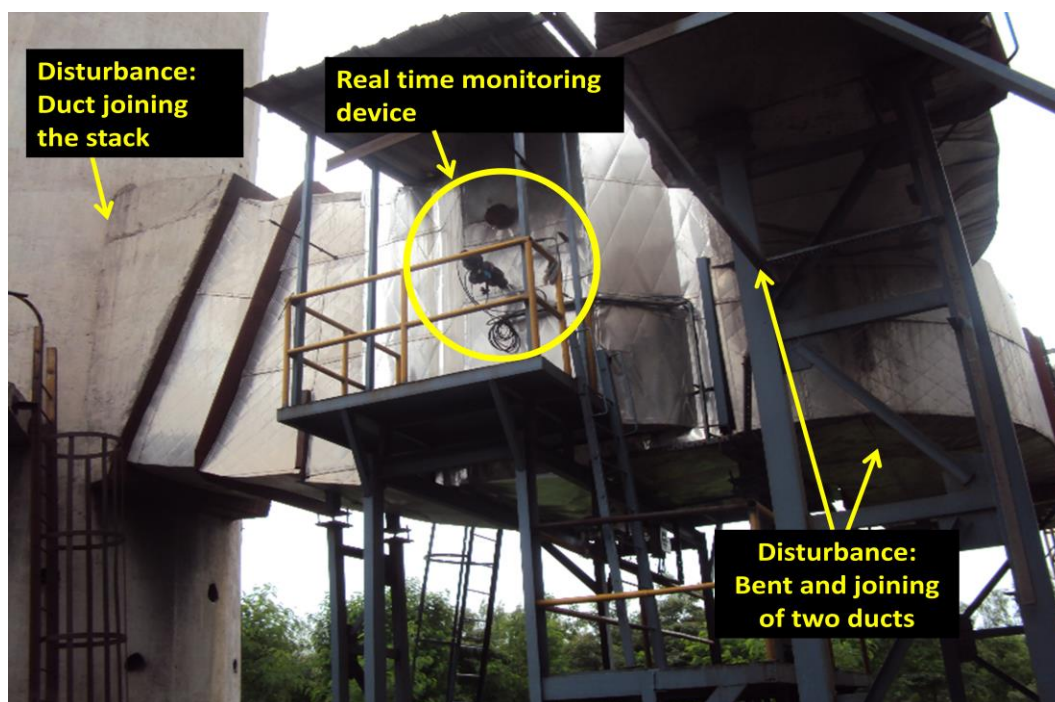
**Figure 1: Status of CEMS installation in industries**

**Defaulters:** Most of the defaulters claimed that orders for equipment have been place and installation is in process. Two of the industries, one from each state, failed to show either installation of equipment or data acquisition system for PM emission monitoring. In one case in Karnataka, there was no data acquisition system connected with the monitor, so there was

nothing to check whether equipment is working or not. In another case in Karnataka, data displayed on equipment and the data collection system was different, clearly indicating false reporting.

**Issues in installation:** Two major issues related to equipment installations are important- one is the selection of suitable technology and other is the correct installation. All the industries have selected technology by getting opinion from the vendors and similar industries. In Madhya Pradesh, industries had also consulted MPPCB while in Karnataka no consultation between industries and KSPCB happened. **Overall, industries had no clue whether the installed technologies were correct or not.**

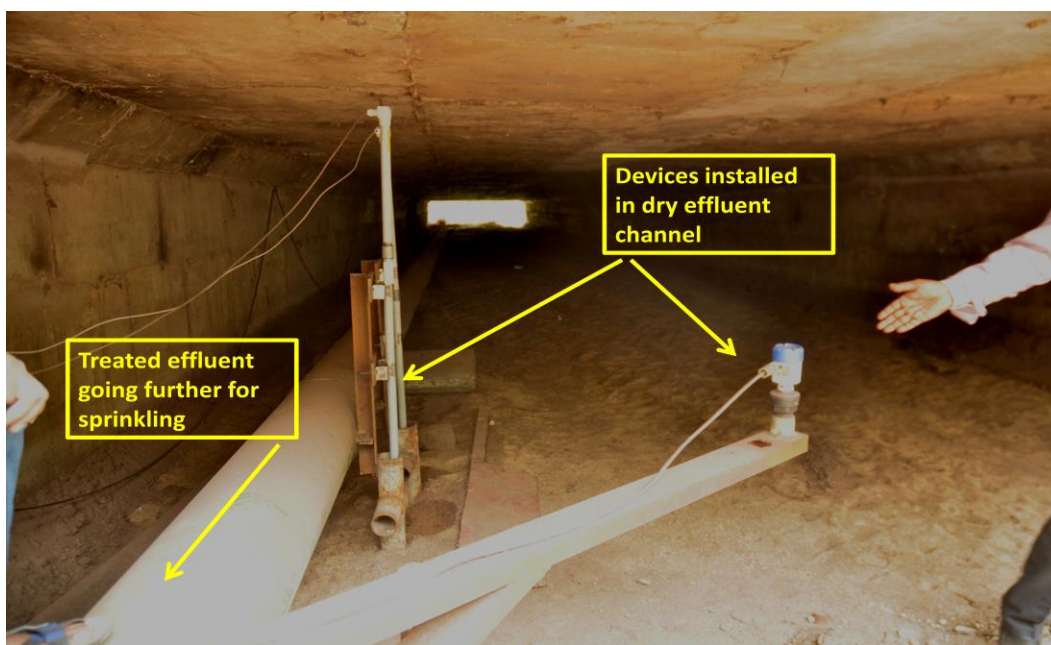
Similarly, majority of industries and local regulators had no clarity on the correct location of equipment installation in the stack with reference to manual sampling port and for representative homogenous sample collection. The survey found that some of the industries have installed equipment in duct without ensuring the correct position required for monitoring. The majority of those have installed the equipments in stacks that have no proper approach/stairs and platform which makes regular maintenance of equipment difficult.



**Figure 2:** CEMS Equipment Installed in Duct in one of the industry in Madhya Pradesh

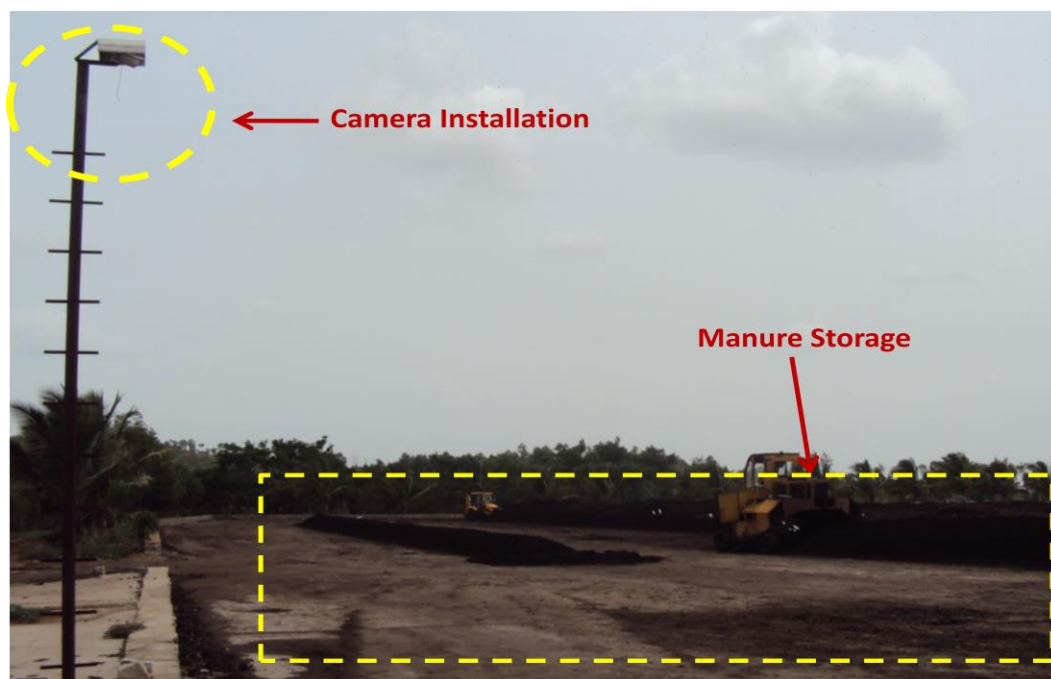
Similarly, there was no clarity on location of equipments installation for continuous effluent monitoring. In some industries the effluent monitoring system was installed in dry effluent outlet and not at the discharge point from ETP.





**Figure 3:** Continuous effluent monitoring equipment Installed in dry effluent channel in an industry in Karnataka

In case of ZLD, the industry has to install camera and flow meter in the channel/drain provided for carrying the effluent from within the industry premises. Many of the industries in Karnataka have installed camera at places where it serves no purpose at all.



**Figure 4:** Camera installed focusing on the manure storage site where treated effluent is mixed with manure

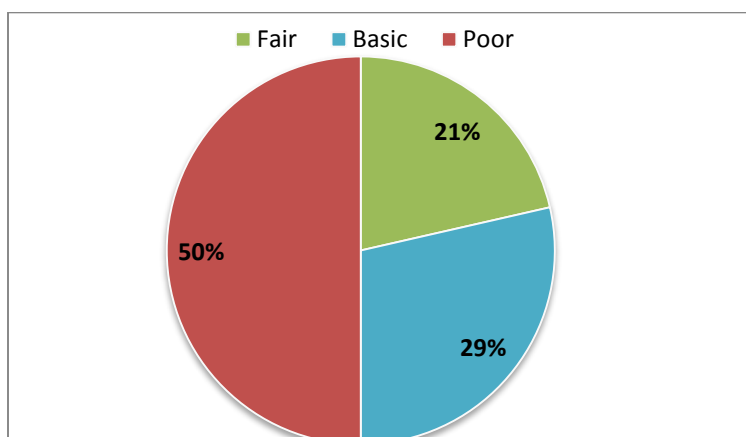
## 2. Knowledge on CEMS

Since, CEMS is a new concept in India, stakeholders including industries and regulators are still in learning phase. The survey looked at the different aspect of basic knowledge of regulators and industries on real time monitoring system. These are as mentioned in the table below.

**Table 2: Parameters looked to understand the level of knowledge on real time monitoring system**

Parameters	Aspects the survey tried to identify
Technology selection	Awareness on the different technologies available Consultation process for technology selection Awareness on quality of equipment or certification
Location for installation of equipments	Awareness of CPCB guidelines on location of equipments Installation as per guidelines or not
Working of the equipment	Knowledge on basic outline of working of the equipment
Regular maintenance	Awareness on adjustment/calibration and drift and span check process and its schedule
Data handling and transmission	Understanding of data acquisition software Frequency of data transfer

Based on the above mentioned factors the level of knowledge on real time monitoring system is divided into three categories: Fair, Basic and poor. Only one third of the surveyed industries had sufficient knowledge required for running CEMS properly.

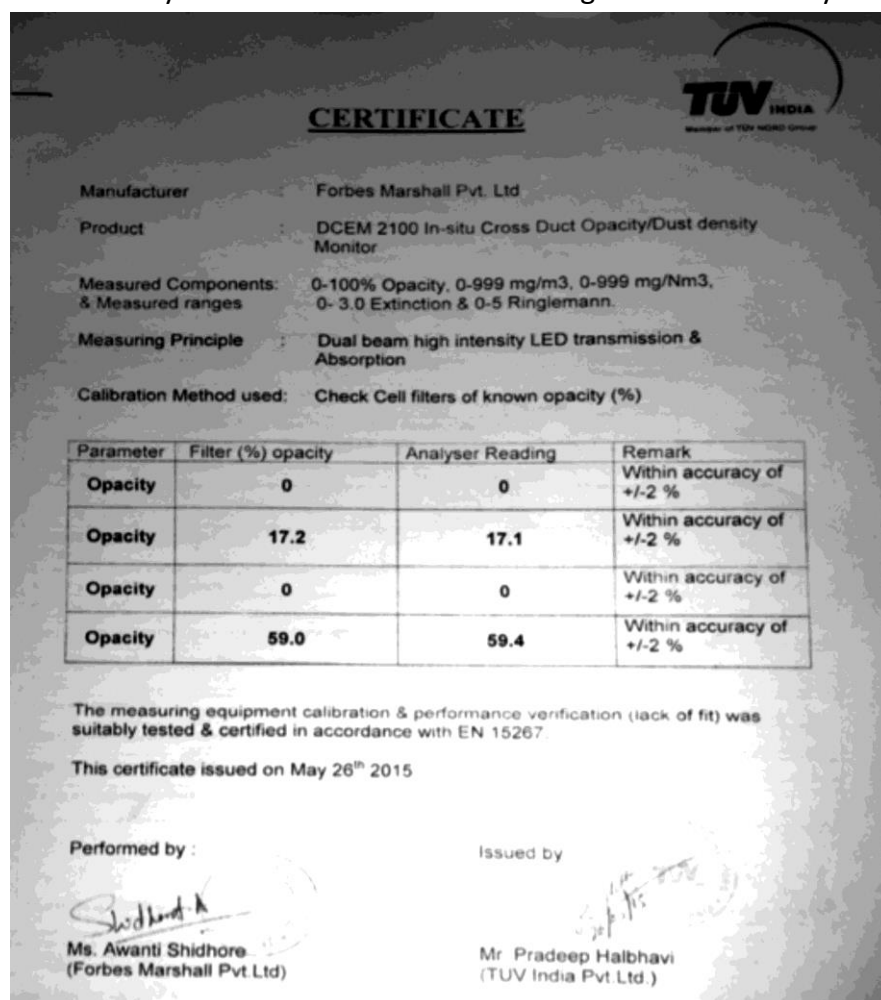


**Figure 5: Level of Knowledge in Industries**

Survey of knowledge level uncovered many important issues which are as follows:

- **Even larger industries lack adequate knowledge on CEMS:** Surprisingly, even larger industries failed to demonstrate sufficient knowledge and proper installation of CEMS. However, they had installed costly equipments but information on correct installation and maintenance was missing.

- **Vendor misguiding on equipment Certification:** There is no CEMS certification system in India, however, a few industries in Madhya Pradesh claimed of installing certified local equipments. When the document was obtained, it was found that a local manufacturer had produced a equipment test report to the industry claiming its equipment a certified product. This clearly shows that the vendor has misguided the industry.



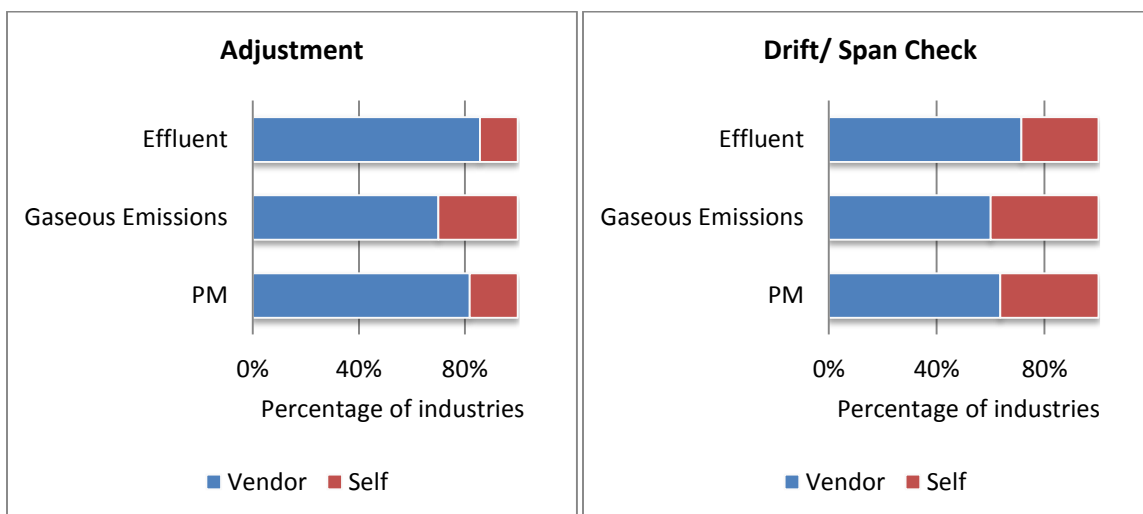
**Figure 6:** Equipment test certificate claimed as certification. Note that TUV India is not accredited to certify CEMS equipment.

### 3. Regular maintenance

Real Time monitoring is not a “fit and forget system”. To ensure a reliable data, regular maintenance like zero drift, span drift and adjustment<sup>1</sup> of the equipment is to be carried at regular intervals. Drift check and adjustment is a fairly easy task if required reference is available. In fact, some of the equipments have inbuilt automatic drift/span check.

<sup>1</sup> Calibration is carried against the set Standard Reference Method which is not a regular activity. The normal maintenance activity which is frequently called calibration is actually Adjustment. It is to be noted that the equipment is calibrated at the time of installation and later on it is adjusted to maintain the calibration.

The survey revealed that majority of the industries was dependent on vendor for adjustment and drift/span check (see graph below). As per the draft notification, the drift check is to be performed daily and since vendor does not visit the site daily, it makes the health checkups of the equipment as questionable. Till date no third party labs are recognized to carry such jobs for CEMS unlike TUV does in Europe.



**Figure 7:** *Dependency of industries for regular maintenance of continuous monitoring system*

#### 4. Availability of skilled Manpower

The equipment for real time monitoring of pollutants being very sensitive and requires skilled manpower for its operation and maintenance. A dedicated and skilled employee is must. At the same time, the regulators also need to have clear understanding of the system to guide industries as well as identify the defaulters. The survey findings are as follows:

- Manpower in Industries:** Nearly 60% of the industries did not even have a dedicated employee to look after real time monitoring system. Majority of the industries have given the responsibility to a person in environment department who is not skilled enough to operate and maintain real time monitoring system. Merely 10-15% of industries have appointed an instrumentation background person for this.
- Manpower SPCBs:** Manpower shortage has been a chronic issue with SPCBs. Above that, lack of adequate knowledge on real time monitoring is one of the biggest hurdles in proper implementation of CEMS. In absence of skilled manpower, SPCBs fail to provide adequate guidance on implementation of real time monitoring system, analyse the same and catch the defaulters.

Preparation for implementation of real time monitoring system at KSPCB was found grossly inadequate. MPPCB has formed an Emergency Response Centre where all the data received from industries is analyzed by a team of 6 people. Apart from this, at least 1-2 inspection officers are present in 16 regional offices specifically for inspecting the status of installation of the system. In case of KSPCB, there is separate cell but only with a team of 2-3 to look after installation of real time monitoring system in industries.

#### **5. SPCB's inclination towards implementation of CEMS**

The successful implementation of CEMS demands initiative from SPCBs, so their inclination towards it is crucial. MPPCB has taken the task of implementation fairly well. Apart from involving a number of people at head office and regional offices it has installed the server to collect data from industries. Nearly 80% of industries are connected to MPPCB and CPCB both. MPPCB is also carrying remote calibration to some industries where equipments support else it is pushing industries to install the system which provides remote calibration. To accelerate the implementation, MPPCB has also conducted two meetings with industries, equipment suppliers and service providers to provide a common platform for discussion on the issues and challenges being faced in implementation. Such initiatives have helped some industries to develop an understanding of the system.

Situation in Karnataka was unfortunately not encouraging. KSPCB has not installed server till date for receiving data from the industries. Therefore in some cases data is being sent to CPCB but not KSPCB which means local regulator has any direct observation on implementation. In a few industries, data is neither being sent to KSPCB neither to CPCB. Apart, no stakeholders meetings or other initiatives by KSPCB to facilitate implementation of real time monitoring were come in notice.

#### **6. Need of capacity building**

The survey clearly reflected that the knowledge base needs to be improved, both for regulators as well as industries. Majority of the industries have shown interest in training on real time monitoring/CEMS which would help them in running the system. Some of the industries preferred to handover the operation and maintenance of real time monitoring system to vendors/third party and not to take risk with such sensitive and expensive equipments themselves. Some of the industries were also satisfied with the trainings provided by the vendors.

Training is equally necessary for regulators. Regulators from both the states expressed interest in capacity building on real time monitoring System.

## Recommendations

The CEMS or real time monitoring system is a good initiative, not only for regulatory perspective but also for better precision of operation optimization. The implementation of the system requires a collaborative effort from regulators, industries, services providers and others. The survey finding indicates that there is a lot to do in this direction. Some of the key recommendations are as follows:

- **Inclination for implementation is crucial:** SPCB's must take interest in implementation of CEMS. It would require developing infrastructure like installation of server to collect data, skilled manpower to keep close watch and consultation with stakeholders to review the situation etc.
- **Consortium of regulators for CEMS implementation:** Responsible regulators from all the SPCBs should create a consortium on CEMS implementation. This will give a common platform for knowledge exchange and facilitate support and mutual cooperation. The consortium will be helpful for all and will lead to uniform and smooth implementation of CEMS or real time monitoring system.
- **Guidance manual needed:** A proper guidance manual is needed which should cover information right from device selection, installation, operation & maintenance to data transfer stage. CPCB and SPCBs need to take extra effort and work with experts and stakeholders to develop this and disseminate the information.
- **Strategic plan for lab empanelment and device certification system:** CPCB and SPCB also need to plan for development of lab empanelment system and device certification system. There must be a time bound strategy to complete this as soon as possible. The delay in setting up system creates chances of inconsistency in implementation.
- **Capacity building for regulators and industries:** Capacity building of regulators and industries is a must. The present level of knowledge on real time monitoring is grossly insufficient therefore needs boost.