Concept Note

Developing a Roadmap for 'Implementing New Emission Norms for Thermal Power Plants'

Implementing New Emission Norms for Power Sector

Background

India is the world's third-largest GHG emitter accounting for 7%[1] of the total global emission. Energy sector, comprising of electricity production, manufacturing industries, transport sector and fugitive emissions contribute to around 71%[2] of country's total GHG emission.

India has ratified Paris agreement on climate change and thus has agreed to a long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels, by bringing down the greenhouse gas emissions.

This has marked a significant shift in the policies of the Government, especially in the sectors which are key contributors to Green House Gas (GHG) emission in the country. India has planned to bring down emission levels of all power plants to national standards by 2022. Government also has plans to close very old power plants.

Ministry of Environment, Forest and Climate Change (MoEFCC) has been regulating emission norms time and again for controlling the pollution levels from Thermal Power Plants (TPPs).

As per the MoEFCC's notification dated 07.12.2015 to limit Emission in Thermal power plants, TPPs were required to achieve the notified limit within 2 years from the date of the notification, i.e. by 07.12.2017. However, the deadline has now been extended to 2022 for the TPPs to comply with the aforesaid norms.

As per the notification, the plants are categorized into 3 categories for compliance with the new norms, namely those: -

(i) Installed before 31st December 2003
(ii) Installed after 2003 upto 31st December 2016 and
(iii) Installed after 31st December 2016.

Mg/Nm^3	**Plant Size**	**Existing (prior) Standards**	**Installed before 31st Dec'03**	**Installed between 1st Jan'04 to 31st Dec'16**	**Installed after 1st Jan'17**
PM	All	150 – 350	100	50	30
SO_2	<500MW	None	600	600	100
	>500MW	None	200	200	100
NO_x	All	None	600	300	100
Hg	All	None	0.03 (>500MW)	0.03	0.03

[1] https://www.hindustantimes.com/india-news/india-among-highest-greenhouse-gas-emitters-in-2016-big-coal-consumer/story-juJex1dknBvLxmQ275YN0K.html
[2] http://www.dnaindia.com/business/report-energy-sector-emits-70-of-country-s-greenhouse-gases-2169900

Water Consumption in TPPs

(i) All Plants with Once through cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption of 3.5m^3/MWh.

(ii) All existing CT Plants must reduce specific water consumption upto 3.5m^3/MWh.

(iii) All plants installed after 1st Jan'17 must achieve maximum specific water consumption upto 2.5m^3/MWh and achieve zero waste water discharge.

Implementing the New Emission Norms

Compliance with the new emission norms required retrofitting existing thermal power plants with auxiliaries to control SO_x, NO_x and PM emissions such as Flue Gas Desulfurization (FGD), Selective Catalytic Reduction (SCR), Electrostatic Precipitation (ESP) systems etc. However, to ensure uninterrupted power supply in the country, the implementation has to be done in phases to avoid problems in power supply, as many units cannot be taken out for retrofitting at the same time.

Central Electricity Authority (CEA), along with regional power committees, drafted a plan last year for the phased implementation of FGD systems at power plants, covering approximately 160 GW of power plant capacity.

FGD Phasing Plan

Year	Capacity (MW)	No. of units
2018	500	1
2019	11, 950	29
2020	24, 560	47
2021	61, 447.5	165
2022	61, 934.5	172
Total	**160, 092**	**414**

Source: CEA

However, FGD systems have been commissioned so far only about 1.8 GW capacity, against the 160 GW of capacity so far where FGD systems were planned to be installed.

Status of FGD implementation in commissioned units (MW)

Sector	FGD Planned	Feasibility Study completed	NIT issued	Bids awarded	FGD commissioned
Central	53,350	51,510	43,260	13,540	-
State	51,885	35,980	3,630	-	-
Private	61,737	42,220	19,750	1,820	1,820
Total	**166,972**	**129,710**	**66,640**	**15,360**	**1,820**

Source: CEA *Note: Status as of September 30, 2018*

Issues and Challenges

While the implementation of the new emission norms is a progressive move, there are various issues and challenges which need to be addressed to ensure the smooth rollout of the aforesaid norms. The various challenges are in the form of:

- Technology Constraints
- Availability of Limestone and Water Consumption
- Requirement of Additional Capex and Opex
- Space Constraints, etc.

Technology Constraints

Implementation of the new pollution control norms provides a huge opportunity to the indigenous manufacturers in the equipment manufacturing segment. This will help boost the Make in India initiative of the Government and help generate employment.

However, since very few of the power producers in the country have prior experience in the selection, procurement, commissioning, operations, maintenance or commercial evaluation of Air Quality Control Systems, for many of the developers it will be a learning experience as the industry grapples from lack of standardization in specifications.

Availability of Limestone and Water Consumption

FGD systems using lime or limestone as the chemical reagent are widely used throughout the world for SO_2 emission control at coal-fired power plants. However, there are also issues related to limestone availability and water consumption; for implementing the FGD installation plans in the thermal power plants across the nation.

The mobilization of Limestone to power plants will create its own environmental foot-print, which again needs to be analyzed and compared to the benefits incurred by installation of FGDs. A rationalization plan, in this regard, will be required to optimize the overall emission reduction.

Requirement of Additional Capex and Opex

As per a recent Centre for Science, Technology and Policy (C-STEP) Report, the total cost of installing pollution control technology in India's thermal power plants is around ₹ 3.91 – 3.96 lakh Crore till 2030. Out of this, equipment such as flue gas de-sulphurizer (FGD), catalytic reducer and electrostatic precipitators alone will account for ₹ 2.57 lakh crore.

This entails additional burden on the project developers and requires huge capex and opex investments. There are various concerns related to what should be the debt and equity ratio in these investments, source of financing etc. **One of the main challenges has been the reluctance on the part of banks and other financial institutions to fund these investments due to high level of stress already prevailing in the sector.**

Technology Required	Approx. Cost
ESP upgradation	5–15 lakh/MW
Partial FGD	25–30 lakh/MW
FGD	50–60 lakh/MW
SCR/SNCR	20–25 lakh/MW

The C-STEP study has projected that to meet the additional expenditure to meet the new emissions standards, the electricity tariffs may need to go up by 25-75 paise per kWh. The revision in electricity tariffs in order to meet the emission standards will be challenging to implement in many States, where power tariffs are regulated. Power plants complying with notified emission norms should be allowed special dispensation against additional expenditure incurred so as not to lose priority under Merit Order Dispatch.

Space Constraints in TPPs

CEA has identified about 72 GW of thermal capacity that is not in a position to install FGD due to the non-availability of space and hence will not be able to comply with the new SO_x emission norms. It would not be prudent to incur additional expenditure for meeting the norms partially for SPM and NO_x and thus could be phased out.

As per the analysis of Mumbai-based Motilal Oswal Securities Limited, the shutting down of some capacity is not likely to disturb the grid much. However, closing as much as 72 GW (over 30 per cent of the installed thermal capacity) can significantly lower the thermal capacity-to-peak demand ratio.

Also, half of this capacity is less than 20 years old and has not recovered its investments. Some plants have, in fact, been commissioned in the past three years – for instance, Rihand power plant of NTPC and Chhabra power plant of Rajasthan Vidyut Utpadan Nigam Limited. Further, some plants, such as NTPC's Korba and NTPC's Vindhyachal, are very crucial and could pose serious grid operation challenges if phased out.

With the closure of more than 25-year-old plants, the electricity market, which currently has excess supply due to low demand for power, could balance sooner than expected. This would help independent power plants and lead to demand for long-term power purchase agreements. It could also boost investments in the transmission segment due to the realignment and construction of new lines to connect the load centres to the new supply points.

Objective of the Workshop

Government has set a deadline of 2022 for compliance with the new norms in a phased manner. However, there are various concerns in the minds of the various stakeholders (like Private Developers, Financial Institutions and Equipment Manufacturers) regarding the aforesaid implementation. It is imperative that the concerns of the industry are addressed to ensure the smooth transition.

In line with this vision, **Federation of Indian Chambers of Commerce and Industry (FICCI)**, under the aegis of **FICCI Power Committee**, is planning to conduct a workshop for developing a roadmap for facilitating implementation of new emission norms for thermal power plants in the country.

The major objectives of this workshop are:

- Initiation of a dialogue among the major stakeholders towards compliance of the new emission norms and its comprehensive implementation
- Addressing the issues and challenges being faced by the industry in the implementation of the revised emission standards
- Exploring available technologies and potential suppliers
- To take up the key findings and recommendations from the workshop with the Government for advocacy on the issue

Workshop Date

The workshop is planned to be organized on **14th February 2019**.

Research Methodology

The workshop would bring-in the various key stakeholders like MoP, MoEFCC, CPCB, CEA, CERC, Private Developers, Equipment Manufacturers and Financial Institutions, under one platform to discuss and deliberate the urgent actions which need to be taken for the smooth implementation of the New Emission Norms.

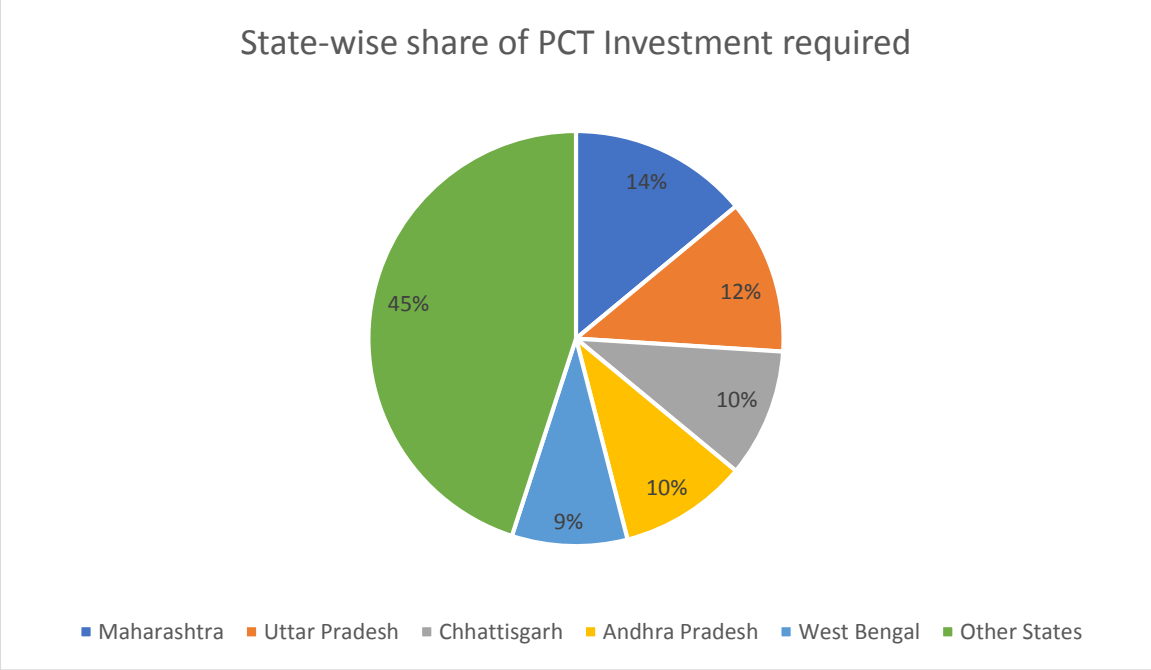
- The workshop would consist of thematic sessions on ***'Framework of New Emission Norms'***, ***'Technology of Pollution Control Equipment'*** and ***'Financing of Emission Control Equipment'***.
- The session on '*Framework of New Emission Norms'* with speakers from **CEA**, **CPCB** will help understand the regulatory framework and core issues around the new emission norms.
- The session on *'Technology of Pollution Control Equipment'* will have participation of Technology Suppliers and research organizations like NEERI**.** This will help in understanding the equipment manufacturers perspective (related to capability, prior experiences etc.)
- During the session on *'Financing of Emission Control Equipment',* speakers from leading Financial Institutions will give the lenders perspective on funding investments on FGD, SCR etc.
- The jist of these sessions will be presented in the final **Valedictory Session.** Secretary – MoP and Secretary – MoEFCC would be attending the final Valedictory Session as the Guest of Honour. During the Valedictory Session, there would also be consultation among the various stakeholders in the presence of the Secretary – MoP and Secretary – MoEFCC on the issue.
- The findings from the workshop will be compiled in the form of a white-paper, which will be submitted to MoP and MoEFCC for perusal.

A tentative agenda is attached herewith as Annex.

Market Opportunity for Equipment Suppliers

The implementation of the new emission norms has created a huge business opportunity for the equipment manufacturers of FGD, SCR etc. To comply with the emission standards, power producers will have to make significant investments in installing Pollution Control Technologies (PCT), i.e., ₹ 0.5–1 crore (INR 5–10 million)/MW for nearly 80% of the plants by 2030. **This will create an industry opportunity of around ₹ 2,50,000 crore (₹ 2500 billion) for the pollution control equipment industry, over the next 15 years.**[3]

Plants in five states (Maharashtra, Uttar Pradesh, Chhattisgarh, West Bengal and Andhra Pradesh) will account for over 50% of the total costs needed for PCT installation, till 2030. Privately owned plants will face the highest costs for implementing these standards (over 45%), followed by state-owned (32%), and centrally-owned plants (24%).



Outcome of the Workshop

The outcome of this Workshop will be

1. A consensus being created among various stakeholders of the sector on the issues and challenges and a likely agreement being formalized for the smooth transition of TPPs to newer emission reduction technology
2. Awareness on various available technologies for controlling SO_x, NO_x and PM

[3] http://www.cstep.in/uploads/default/files/publications/stuff/CSTEP_Report_BCA_of_Emission_Standards_for_TPPs.pdf

3. A white-paper consisting of key findings and recommendations from the workshop for advocacy on the issue to help address the concerns of the industry in complying with the new norms

Workshop on 'Implementing New Emission Norms for Power Sector'

Date: 14th February 2019

Venue: Federation House, Tansen Marg, New Delhi

Theme: Developing a Comprehensive Roadmap for implementation of New Emission Norms for Thermal Power Plants

Time Slot	Session	Key Themes	Speakers/ Panelists
9:30 – 10:00	***Registration***		
10:00 – 10:05	***Welcome Remarks*** *by FICCI*		
10:05 – 10:10	***Opening Remarks*** *by Shri K Krishan, Chairman, FICCI Climate Change Committee*		
10:10 – 10:30	***New Emission Norms in Power Sector (****Impact, Implication & Path Forward) by Dr. Anshu Bharadwaj, Executive Director, CSTEP*		
10:30 –12:00	***Panel Discussion on Framework of New Emission Norms*** ***Agenda of the Panel Discussion:*** *State of Preparedness - Controlling SOx, NOx, SPM, Mercury & Water Conservation* • *Overcoming Installation Barriers* • *Implementation Plan and Roadmap* • *Cost Implications and Solutions*	***Session Chair*** *Shri A.K. Jain, Additional Secretary, MoEFF&CC* ***Speakers*** *Dr. Prashant Gargava, Member Secretary, CPCB* *Shri Ghanshyam Prasad, Chief Engineer (R&R), Ministry of Power* *Shri P.D. Siwal, Member (Thermal), CEA* *Dr. Arbind Prasad, Chairperson, JSERC* *Shri Anand Kumar, Chairperson, GERC* *Shri Prabir Neogi, Chairman, FICCI Power Committee and Chief Executive - Corporate Affairs - RP- Sanjiv Goenka Group* *Shri S.K. Chatterjee, Joint Chief (Regulatory Affairs), CERC* *Shri Ashis Basu, CEO- Energy Corporate, GMR Energy Ltd.* *Shri Ashok Machher, President (Corporate Affairs), Hindalco Industries Ltd.* *Dr. Arunabha Ghosh, CEO, Council of Energy, Environment and Water*	
12:00 – 13:30	***Panel Discussion on Technology of Pollution Control Equipment***	***Session Chair*** *Dr. Rakesh Kumar, Director, CSIR - NEERI*	

	Agenda of the Panel Discussion: • *Manufacturers' Perspective* • *Users' Perspective* • *International Experience*	***Speakers*** *Shri S.N. Roy, Chairman, L&T* *Mrs. B.Padma S.Rao, Senior Principal Scientist, NEERI* *Shri Ashwani Kumar, Chief Executive Officer, IL&FS Energy* *Shri Mohit Bhargava, Executive Director, NTPC Ltd.* *GE Power India Ltd.* *Thermax*
13:30 – 14:30	*Networking Lunch*	
14:30 – 15:40	***Panel Discussion on Financing of Emission Control Equipment*** ***Agenda of the Panel Discussion:*** • *Funding Universe and Impact* • *Bank Finance and Lenders' Perspective* • *Scope of Alternative Finance – Series Funding, Equipment Finance, Zero Coupon Bonds* • *Context of Stressed Assets* • *Scope for Fiscal Incentives*	***Session Chair*** *Dr. Arun Kumar Verma, Joint Secretary, Ministry of Power* ***Speakers*** *Shri P. Suresh, Head – Project & Infrastructure Finance Group, ICICI Bank Ltd.* *Dr. Fareed Ahmed, ED, Punjab and Sindh Bank* *Shri Nitin Jain, Partner (Restructuring & Turnaround), Ernst & Young* *Shri Priyavrat Bhati, Programme Director (Energy Programme), CSE* *Shri Sanjay Jain, Sr. VP (Research), Motilal Oswal Securities Ltd.* *JSW Energy Ltd.* *SBI*
15:40 – 16:00	*Tea/Coffee Break*	
16:00 – 16:10	• *Welcoming the Guests of Honour (Secretary- MoPower & Secretary- MoEFF&CC) by Shri K Krishan, Chairman, FICCI Climate Change Committee*	
16:10 – 16:30	Summarized Presentation	Outcome Presenatation on the Panel Discussions by *Ms. Shweta Srinivasan, Research Scientist, CSTEP*
16:30 – 17:00	Guest of Honour Address	Address by ***Shri Ajay Kumar Bhalla, Secretary, Ministry of Power, Government of India***
17:00 – 17:30	Guest of Honour Address	Address by ***Shri C.K. Mishra, Secretary, Ministry of Environment, Forest & Climate Change, Government of India***
17:30 – 18:00	***Concluding Remarks*** *Shri Prabir Neogi, Chairman, FICCI Power Committee & Chief Executive (Corporate Affairs), RP-Sanjiv Goenka Group*	

18:00 Onwards	*High Tea*