BRIEF REVIEW OF THE NEW MOEF&CC ENVIRONMENTAL RULE

The notification from MoEF&CC dated 7th December-2015 amends existing norms related to emission of SPM and introduces new norms for emission of SO_2, NO_x and Mercury from Thermal Power Plants (TPPs). It also specifies modified limits for specific water consumption by TPPs and insists to convert existing once through based condenser cooling system to recirculation type. Different limits are specified based on capacity of power plant and year of installation. A summary of new regulations on air emission is given in below:

NEW REGULATIONS ON EMISSION

Date of Installation	PM	SO_2	NO_x	Mercury (Hg)
Before 31-12 2003	100 mg/Nm^3	600 mg/Nm^3 for <500MW 200 mg/Nm^3 for >=500MW	600 mg/Nm^3	0.03 mg/Nm^3 for >=500MW
After 01-01-2004 & Upto 31-12-2016	50 mg/Nm^3	600 mg/Nm^3 for <500MW 200 mg/Nm^3 for >=500MW	300 mg/Nm^3	0.03 mg/Nm^3
On or after 01-01-2017	30 mg/Nm^3	100 mg/Nm^3	100 mg/Nm^3	0.03 mg/Nm^3

SUMMARY OF NEW REGULATIONS ON WATER USE

Sl. No.	New requirement
1	All plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption up to maximum of 3.5 m^3/MWh within a period of two years from the date of publication of notification.
2	All existing CT-based plants reduce specific water consumption up to maximum of 3.5 m^3/MWh within a period of two years from the date of publication of notification.

3	New plants to be installed after 1st January 2017 shall have to meet specific water consumption up to maximum of 2.5 m^3/MWh and achieve zero waste water discharged.

Further, to the above MOEF & CC notification, MOEF &CC has subsequently issued an amendment dated 28th June 2018 for stack height post FGD and water Consumption which is mentioned below:

SUMMARY OF NEW AMENDMENT

Stack Height post FGD installation :

Sl. No.	Industry	Parameter	Standards	Remarks
1	Thermal Power plants with Flue gas Desulphurization (FGD)	Stack Height/Limit in Meters	Power Generation capacity : **100 MW and above** $H = 6.902 (QX0.277)^{0.555}$ Or 100 m Whichever is more	
			Less than 100 MW $H = 6.902 (QX0.277)^{0.555}$ Or 30 m Whichever is more Q = Emission rate of SO_2 in kg/hr* H = Physical stack height in meter *Total of the all units connected to stack Note: These standards shall apply to coal /lignite based Thermal Power Plant.	

- All monitored values for SO_2 and NO_x shall be corrected to 6% Oxygen, on dry basis.
- Specific water consumption shall not exceed maximum of 3.0 m^3/MWh for new plants installed after the 1st January 2017 and these plants shall also achieve zero waste water discharge.
- Seawater based plants are exempted from conversion of once through to Cooling Tower based system.

TECHNOLOGY SELECTION

Though there are various technologies which are in use for De-Sox treatment of flue gases from thermal power plant, but since introduction of FGD technologies at mass scale is in nascent stage in Indian power sector, only a few technologies for De-Sox is being advised here, however with the exposure and practical experience over the years new FGD technologies may be introduced in near future.

The main selection criteria among other parameters for FGD technology are:

1. SO_2 removal efficiency
2. Units size
3. Balance Plant life
4. Geographical location of Thermal power plant.

A brief about the FGD Technologies considering above mentioned parameters is as under;

Dry Sorbent Injection (DSI)/Dry type FGD:

The FGD technologies based on dry sorbent injection is particularly preferable for small unit size i.e. 60 MW-250MW range since the reagent cost in this technology is relatively higher then Wet-lime stone and ammonia based FGD, hence units running on low PLF and with less balance operating life (07-09 years) is more preferable for DSI. The adaptation of this technology may be finalized on the base of conducting Techno-economic feasibility considering following factors;

a) PLF of the Unit
b) Required efficiency of the FGD system
c) Balance operating life
d) OPEX (Reagent Consumption)

Additionally DSI based technologies have considerably low CAPEX (1/4th) and very less APC (1/10th) compared to Wet Limestone and Ammonia based FGD technologies.

However for final selection of this technology it is advised to conduct “Life Cycle Cost benefit analysis” in comparison to other available technologies.

Ammonia Based FGD Technologies:

The FGD technologies based on Ammonia as a reagent are preferable for units size below 500 MW. Ammonia based technologies have approx. 10% less CAPEX and APC as compared to Limestone based FGD. Additionally Ammonia based FGD technologies has an added advantage of readily saleble By-product ie. Ammonium Sulphate.

However while choosing Ammonia based FGD technologies, the handling of Ammonia and its availability may be worked out. Although units are advised to conduct “Life Cycle Cost benefit analysis” while choosing either of the mentioned technologies.

Limestone Based FGD Technologies:

The FGD technologies based on limestone slurry as reagent are most versatile and prominent for any unit size. However for optimum selection of technology plant specific factors like Unit size, balance unit life, space availability, salebility of by-product etc needs to be considered. Lime stone technology have large foot print, relatively higher CAPEX and Reagent purity issues while comparing with Ammonia based and dry type FGD technologies.

Hence units are advised to conduct “Life Cycle Cost benefit analysis” while choosing the available FGD technologies.

Geographical factors of Plants:

While choosing FGD technologies for Thermal power plants, geographical location of the plant is a critical factor. I.e. Plant located on sea coast may prefer for Sea based FGD technologies and similarly, distance & availability of reagent should also be looked into. Other plant specific requirements may be considered for Life cycle costing keeping OPEX in consideration.

The above mentioned technologies/factors needs to further evaluated before finalization of technology for a thermal power plant since every plant have specific requirements which needs to be evaluated on case to case basis such as:

a. Coal Quality
b. Unit size and no. of units
c. Space availability at plant
d. Availability of reagent and purity level of reagent
e. Disposal of by product
f. Balance plant Life
g. Auxiliary Power Consumption
h. Life cycle costing
i. Availability of water
j. Efficiency of FGD system
k. Consideration of New stack/Modification of stack.
l. PLF of plant