Council of Enviro Excellence

Topic :-
New Environmental Laws

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New Environmental Norms

Updates on the progress and perspectives

New Environment Norms

Emission parameter	TPPs (units) installed before 31.12.2003	TPPs (units) installed after 01.01.2004 and up to 31.12.2016	TPPs (units) to be installed from 01.01.2017
Particulate Matter	100 mg/Nm³	50 mg/Nm³	30 mg/Nm³
Sulphur Dioxide (SO_2)	600 mg/Nm³ for units less than 500MW capacity	600 mg/Nm³ for units less than 500MW capacity	100 mg/Nm³
	200 mg/Nm³ for units 500MW and above	200 mg/Nm³ for units 500MW and above	
Oxides of Nitrogen (NOx)	600 mg/Nm³	300 mg/Nm³ (Revised to 450 mg/Nm³)	100 mg/Nm³
Mercury	0.03 mg/Nm³	0.03 mg/Nm³	0.03 mg/Nm³
WATER NORMS	i. All plants with Once Through Cooling (OTC) shall install Cooling Tower (CT) and achieve specific water consumption of 3.5 m³/MWh within 2 years of notification. ii. All existing CT based plants shall reduce specific water consumption up-to maximum of 3.5 m³/MWh within a period of 2 years. iii. (*)New plants to be installed after 1.1.2017 shall have to meet specific water consumption of 2.5 m3/ MWh & achieve zero water discharge.		

New deadlines to meet emission norms

MOEF&CC vide its notification dated 05.09.2022 has issued new timelines for installation of FGD in TPPs based on the categorization viz A, B, & C. The new timelines are as under:

Sl. No.	Category	Location/area	Timelines for compliance (Non-retiring units)		Last date for retirement of units for exemption from compliance	
			parameters other than SO_2 emissions	SO_2 emissions	parameters other than SO_2 emissions	SO_2 emissions
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Category A	With 10 km radius of National Capital Region or cities having million plus population[1].	Up to 31st December 2022	Up to 31st December 2024	Up to 31st December 2022	Up to 31st December 2027
2	Category B	With 10 km radius of Critically Polluted Areas[2] or Non-attainment cities[2]	Up to 31st December 2023	Up to 31st December 2025	Up to 31st December 2025	
3	Category C	Other than those included in category A and B	Up to 31st December 2024	Up to 31st December 2026	Up to 31st December 2025	

Categorization of TPPs

A phasing plan for all India coal/ lignite based TPP units has been finalized by the Taskforce comprising of members from MoEF&CC, MoP,CEA and CPCB for implementation of pollution control equipment.

The following is the final categorization:

Category	Units	Capacity (MW)
A	66	20577
B	72	24057
C	462	166885.5
Total	600	211519.5

SO2 Control Technologies

- Wet FGD
  - $CaCO_3(s) + SO_2(g) \rightarrow CaSO_3(s) + CO_2(g)$
  - $Ca(OH)_2(s) + SO_2(g) \rightarrow CaSO_3(s) + H_2O(l)$
  - $CaSO_3(aq) + 2H_2O(l) + ½O_2(g) \rightarrow CaSO_4 \cdot 2H_2O(s)$ (Gypsum)

- Dry Sorbent Injection (DSI)
  - $2NaHCO_3(s) + heat \rightarrow Na_2CO_3(s) + H_2O(g) + CO_2(g)$
  - $Na2CO3(s) + SO2(g) + 1/2(O2) \rightarrow Na2SO4(s) + CO2(g)$
  - $Na_2CO_3(s) + SO_3(g) \rightarrow Na_2SO_4(s) + CO_2(g)$

- Semi-dry FGD
  - CaO + H2O → Ca(OH)2 + Heat
  - SO2(g) + Ca(OH)2 → CaSO3 • ½ H2O(s) + ½ H2O(g)
  - CaSO3 • ½ H2O(s) + ½ O2 + 1.5 H2O(g) → CaSO4 • 2 H2O (s)
  - SO3(g) + Ca(OH)2 + H2O → CaSO4 • 2 H2O(s)

- Ammonia FGD
  - $2NH_3 + SO_2 + H_2O \rightarrow (NH_4)_2SO_3$
  - $(NH_4)_2SO_3 + ½. O2 = (NH_4)_2SO_4$

- Seawater FGD
  - $SO_2(g) + H_2O(l) + ½O_2(g) \rightarrow SO_4 2-(aq) + 2H^+$
  - $HCO_3- + H^+ \rightarrow H_2O(l) + CO_2(g)$

- Wet Sulphuric Acid Process
  - $SO_2 + ½O_2 \rightleftharpoons SO_3$ (Oxidation) (in presence of Vanadium oxide catalyst)
  - $SO_3 + H_2O \rightleftharpoons H_2SO_4$ (g) (Hydration)
  - H_2SO_4 (g) $\rightleftharpoons H_2SO_4$ (l) (Condensation)

SO2 Control Technologies Selection

Technology	60-250 MW 600 mg/Nm³	500 MW 200 mg/Nm³	660 MW 200 mg/Nm³	800 MW 100 mg/Nm³	Remarks
Wet Limestone	□	□	□	□	• High Capex , Low Opex • Strong supply chain for input and by-product
Sea Water					• Suitable for coastal plants • Open water cycle
Ammonia Based FGD					• Mainly one Chinese Supplier • Ammonia required, • safety hazards
Semi-dry	□				• Suitable for 300 MW & below units • Existing chimney can be used • Increase APC
Dry sorbent Injection	□				• Low Capex and High Opex • Suitable for older units • Low efficiency, Low PLF

FGD
Implementation status

Challenges in Execution (1/2)…

- Taking into account of present equipment manufacturing capability, availability of steel, cement & market scenario and views of Vendors it is found that presently the estimated average Vendor capability is about 15-17 GW/year (32-36 units) and installation time is about 48 to 52 months.

- About 20% of FGD component is not manufactured in India. Thus, import from other countries is the only option and to create a manufacturing capability of these items in India would take few years.

- Supply chain disruptions and migration of workforce due to Pandemic: Many sub-contractors have gone under distress due to work disruptions during pandemic which badly affects work progress. Various indigenous and foreign vendors have become stressed.

- Due to huge gap in demand and supply of equipment in FGD market, prices are escalating exorbitantly. The project cost for wet lime based FGD technology has increased considerably and there have been instances where the project cost has been above 1.4 crore per MW.

Challenges in Execution (2/2)

- FGD orders envisage retrofitting of FGD components in brown field projects. Such jobs have their distinguished difficulties in terms of conceptualisation & design challenges. Standardisation could not be done as different sites have different requirement, space constraints, geography, orientation etc. Such jobs are more like Renovation & Modernisation kind of jobs & encounter frequent re-engineering issues.
- State Gencos are facing fund constraints. Lenders' response has not been encouraging mainly due to poor financial conditions of utilities
- Generation loss for the shut down period.
- OPEX- Auxiliary Consumption will increase by 1 to 2%, Limestone cost will be added. All of these will lead to increase tariff of electricity.
- About 1.5% increase in CO2 emission will result due to FGD installation which has the potential to exacerbate the problem of global warming.
- Availability of quality Limestone and its transportation.
- Disposal issues for by-product such as Gypsum

Thank You

Thanking You on Behalf of !

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