CSE WEBINARS

REPLACEMENT OF SMALL BOILERS WITH COMMON STEAM BOILERS IN INDUSTRIAL AREAS

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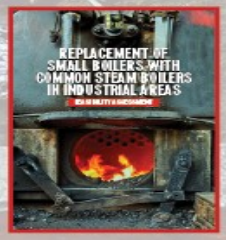

Online Release of
CSE's new report:
Replacement of small boilers with common steam boilers in industrial areas

About the study

Background

- Centre for Science and Environment (CSE) r*eport on Assessment of Industrial Air Pollution in Delhi-NCR.*
- Number of small boilers operating- steam generation
- Emission standards- very relaxed.
- Air pollution control devices- mostly absent.

Objective

- Assess the feasibility of replacement of small boilers (< 2 TPH) or even medium-sized boilers (2-10 TPH) in industrial areas or clusters with a common facility for steam generation.

Common boilers are centralized systems that cater to the demand of steam generation of member industrial units by establishing a steam pipeline network within an industrial area.

District-wise no. of small boilers in Delhi NCR

District/region	No. of boilers	Boiler capapcity range			
		<2	**2-<10**	**10-<15**	**>15**
Alwar	63	44 (70%)	8 (13%)	5 (8%)	6 (10%)
Bhiwadi	111	53 (48%)	48 (43%)	7 (6%)	3 (3%)
Ghaziabad	140	102 (73%)	24 (17%)	4 (3%)	10 (7%)
Faridabad	132	54 (41%)	65 (49%)	8 (6%)	5 (4%)
Gurugram	69	Data not available			
Panipat	163	53 (33%)	98 (60%)	7 (4%)	5 (3%)
Sonipat	212	Data not available			
Total		**53%**	**36%**	**6%**	**5%**

Source: CSE analysis based on report on Assessment of Industrial Air Pollution In Delhi-NCR, 2019–20

Methodology

- CSE assessed the contribution of small boilers in the pollution load of each industrial area
- Aspects of feasibility assessment for replacement
  - Technical, economical, legal and environmental
- Estimation of investment required for establishing a common boiler in a new industrial area- Comparative analysis of CAPEX and OPEX.
- A pilot proposal for an industrial area, based on the actual data, cost benefit analysis and pollution load estimation.

Findings & Recommendations

Issues with small boilers

- The PM emissions standards for small boilers for boilers with capacity <2 TPH is 1,200 mg/Nm3.
- Number is large, difficult to be physically monitored by SPCBs.
- Usually operate through batch-type process- no proper monitoring possible.
- High coal consumption. Manual coal feeding and no automation- housekeeping practices.
- Safety: IBR or non-IBR.

Common boilers

- Generally, atmospheric fluidized bed combustion (AFBC) boilers or circulating fluidized bed combustion boilers (CFBC) boilers installation.
- Thermal efficiency of a common FBC boiler is in the range of 80–85 per cent.
- Reduced PM emissions levels. PM, SO2 and NOx emission control.
- Availability of steam at the doorsteps of units.
- The concept was included in Gujarat's Industrial Policy of 2015, as a scheme of assistance for common environment infrastructure.
- At present, three such projects are in operation in Gujarat with around 90 units connected to three common boiler facilities.

Feasibility aspects

Aspect	Industry with Small Boiler	Industry with Common Boiler
Technical		
Steam availability	Intermittent	Continuous
Efficiency	65–70	80–85
Automation	Nil	Full
Economics		
Boiler installation	Rs.700,000	Nil
O&M	Rs. 1,000,000	Nil
APCD	Rs. 5,50,000	Nil

Feasibility aspects

Aspect	Industry with Small Boiler	Industry with Common Boiler
Environmental		
Emission standards for PM	1,200 mg/Nm3	No boiler installation in industry premises
Monitoring cost	Rs. 120,000/- per year	No monitoring Required
CEMS cost	Rs. 1,000,000	No CEMS installation required
Regulatory		
Inspection	4 visits per year	no inspection required related to air pollution control
Boiler permission	Required	Not required

Overall benefits

- Reduction in industrial air pollution by 65–70 per cent.
- 25-30 per cent reduction in coal consumption. Can operate on other cleaner fuels. Cost vary.
- Reduced monitoring load on regulators and industries.
- Improved availability of steam.
- Increasing productivity
- Safer industrial areas and work place.
- Auto-firing and automatic ash handling- Providing hygienic conditions to workers.
- Overall CAPEX and OPEX will reduce significantly.

Boiler fuel	**Cost of steam (Rs per kg)**
Coal-fired: Inconsistent usage	3
Coal-fired < 2 TPH	2
Coal-fired > 2 TPH	1.6
Gas-fired	3–3.5
Fuel oil-fired	3.5
Briquette-fired	2.5–3
Common boiler with coal	1.8–2.2

Proposal for Loni industrial area

- **Loni industrial area has 86 industrial units with small boilers.**
- **About 76 per cent of the units (66 units) located in in Arya Nagar and Roop Nagar (textile area) have small boilers**
- **Total boiler capacity of 66 units- 35 TPH.**

Cost–benefit analysis in Loni industrial area

Parameter	Unit	Baby boilers (66 nos.)	Common Boiler	For single industry	Source
Total capacity	**TPH**	35	35	0.5	Data provided by UPPCB.
Efficiency of boiler	**%**	65%	80%	65%	Efficiency assumed, BEE
Steam production	**TPD**	420	420	6	100% loading
Avg Coal consumption	**TPD**	107	87	1.5	Calculated **(for 12 hrs operation/day)**
Fuel Saving	**TPD**	20		1.5	
Monthly coal cost	**Rs.**	25,781,538	20,947,500	368,308	Calculated @ Rs. 8000/tonne
Cost of steam	**Rs. /tonne**	2046	1663	2046	
Saving on steam cost	**Rs. /tonne**	**384**			Each industry will get saving on steam cost
Saving on steam cost	**Rs./month**		**4,834,038**	**69,058**	Since the steam cost for a single industry also changes, thus the saving is with reference to before and after switching to common boiler
	Rs./year		**58,008,462**	**828,692**	

•PM emissions load will be reduced by 84 per cent as the norm limit for a boiler of more than 15 TPH capacity is 150 mg/Nm3.

•SO2 and NOx emissions will be reduced by about 13-20 per cent each.

Region and industrial area-wise pollution load from small boilers

District/industrial area	Avg % share of small boilers in loading	No. of units
Panipat	**13%**	**83**
Ind Area Panipat	27%	25
Sec 29 HUDA Ph 1	19%	5
Sec 29 HUDA Ph 2	35%	44
Alwar	**6%**	**34**
Neemrana	14%	11
Sotnala	12%	4
Bhiwadi	**12%**	**53**
Chopanki	30%	15
Faridabad region	**10%**	**57**
Faridabad	12%	32
Ghaziabad	**16%**	**105**
Loni	74%	86
Sahibabad	11%	15

•The average share of small boilers in the overall pollution load is in the range of 6–16 per cent for different districts.

•It is viable to develop common boiler systems in areas where share of small boilers in the total pollution load is significant.

•Feasibility assessments may be conducted.

Recommendations

- Preliminary feasibility of installing common boilers in industrial areas in Delhi-NCR to replace small boilers.
- Clauses concerning common boilers, should be included in industrial policy.
- Government and PCBs of states in Delhi-NCR should share the technical and environmental benefits of having such systems with owners and administration of industrial units.
- Stakeholder interactions to understand the cost economics and benefits in detail.
- Inclusion in developmental plan of any upcoming industrial area at the planning stage itself.

Challenges and requirements

Concerns

- Permission from different departments
- Land availability

Requirements

- Raw water availability
- Effluent water management
- Maintenance of an emergency management team with a high level of automation is mandatory.
- Safety while designing the steam pipeline network- Movement of vehicle.

Thanks