# Technology Demonstration for Air Pollution Control in Textile Dyeing Cluster of Ludhiana

By:

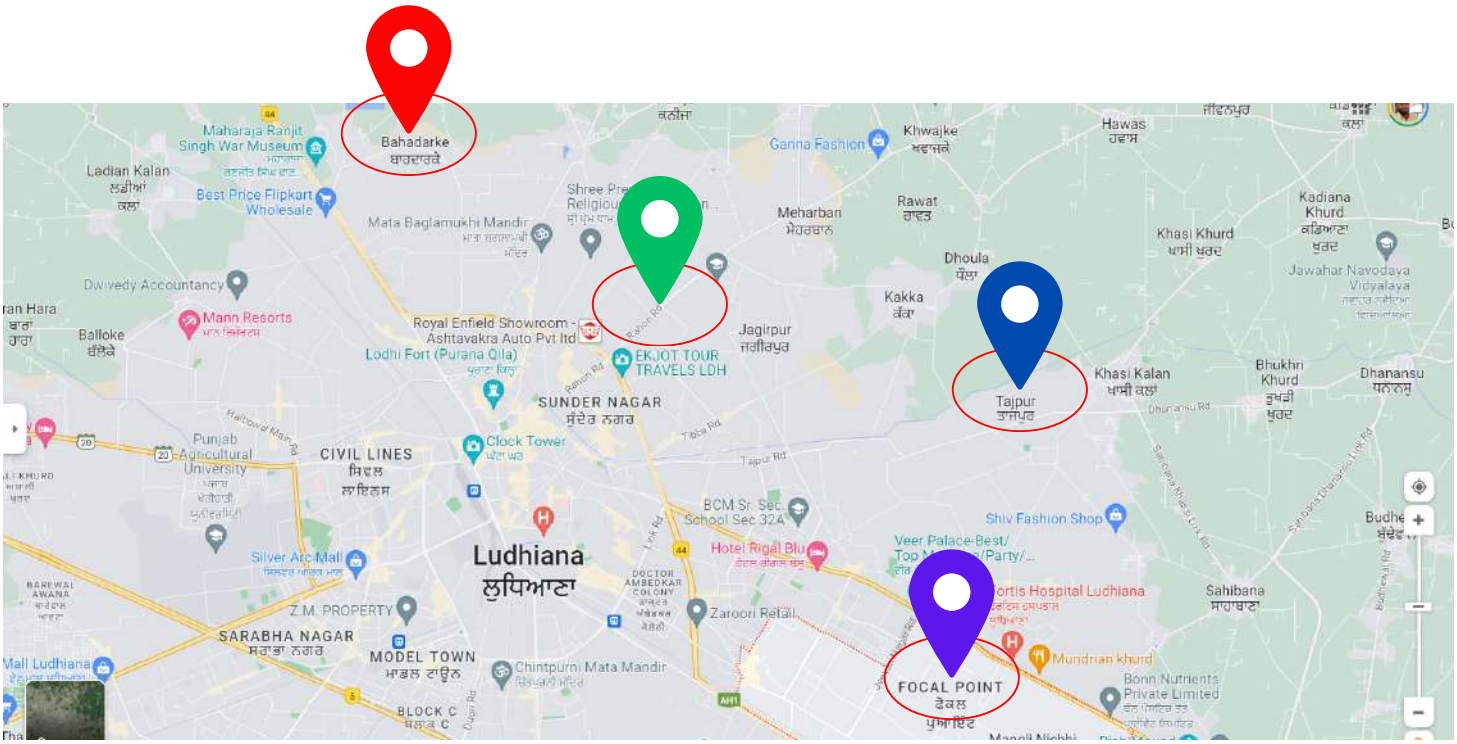
**Punjab State Council for Science & Technology**

Under:

**Mission Tandarust Punjab**

# ABOUT TEXTILE DYEING CLUSTER OF LUDHIANA

‘Ludhiana’ known as the ‘Manchester of India’ has biggest textile manufacturing cluster in North India. It is a major exporter of apparel & hosiery products. Around 300 small & medium scale textile dyeing units are located on the Tajpur road, Bahadur-Ke-Road, Rahon road, focal point etc of Ludhiana. Rice husk, Pet coke, biomass briquette, wood etc. are used as fuel for steam generation in their boilers and heating oil is used in thermic fluid heaters (thermopacks). The boiler capacity generally varies from 2 TPH to 10 TPH. Estimated total consumption of fuel (rice husk, pet coke, biomass briquettes, wood, dung cake & high speed diesel) by these units is 3.57 lakh ton (1.67 lakh tons of oil equivalent) per annum.



## AIR POLLUTION FROM TEXTILE DYEING UNITS

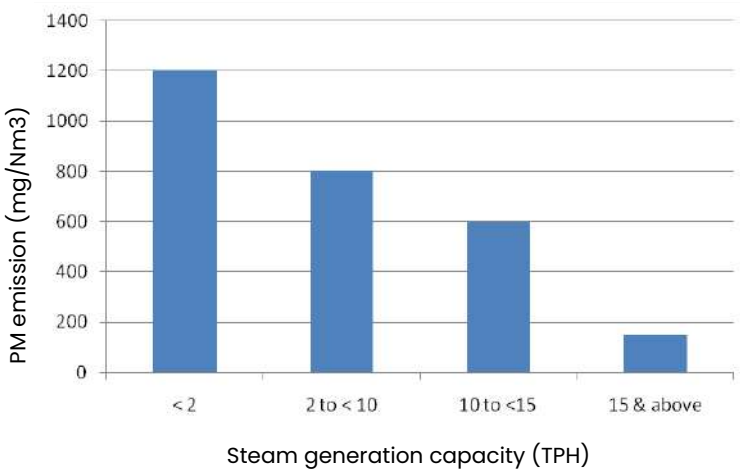
Source apportionment study of Ludhiana city conducted by Punjab State Council for Science & Technology (PSCST) jointly with The Energy & Resources Institute (TERI) & Punjab Pollution Control Board (PPCB) revealed that industrial sector is the major contributor for $PM_{10}$ emission (35%) followed by road dust (28%), vehicular pollution (16%), biomass & garbage burning (16%) and others (5%). Textile dyeing units are one of the predominant industrial sectors in the city having following air pollution issues:

- Erratic black smoke from stacks.
- Poor fuel preparation practice & inadequate combustion control in boiler/thermopack furnace.
- Existing air pollution control systems in pet-coke fired boilers are unable to achieve $SO_2$ emission standards.
- Dust removal efficiency of existing APCDs is <70%.

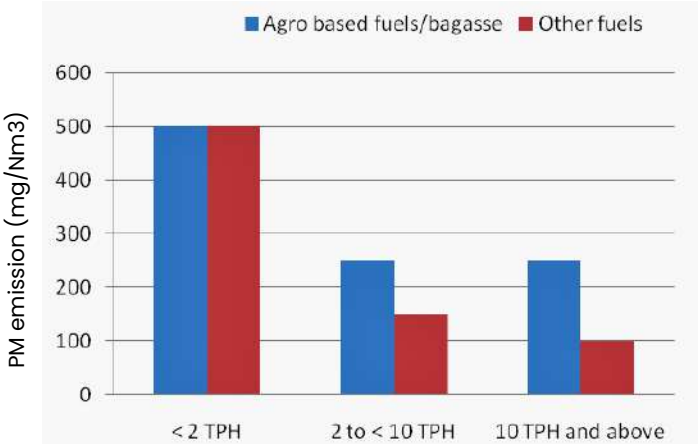
## REVISED EMISSION STANDARDS BY MOEF&CC, GOI

MoEF&CC, GoI recently revised the emission standards of industrial boilers to be applicable from May, 2025.

**Existing PM Emission Standards**

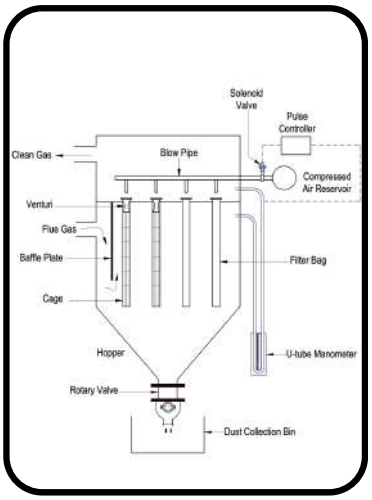



**Revised PM Emission Standards**



# Technology Demonstration for effective Air Pollution Control

With a foresight to enable industry to bring down its emissions and to achieve the revised emission standards, PSCST has developed & demonstrated tech. interventions in textile dyeing units using varied fuels.



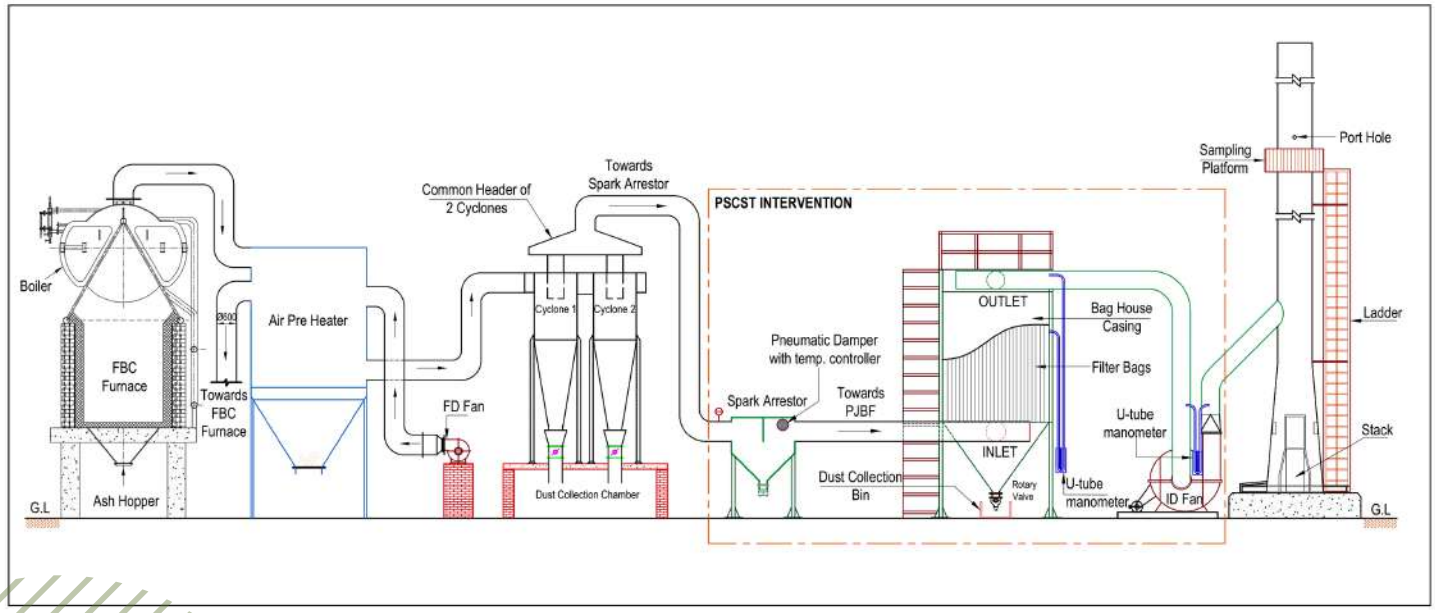

### A) Tech. Intervention for industrial unit using rice husk as fuel

Pulsejet Bag filtration (PJBF) technology has been demonstrated at M/s Sukartik Clothing Pvt. Ltd., Ludhiana for control of particulate emissions from rice husk fired boiler. In bag filtration technology, large array of filter bags are used for arresting the dust particles on the surface of bags. Compressed air at high velocity is passed in the bags, in reverse direction to airflow, for cleaning of bags.

Salient features of demonstrated technology are:

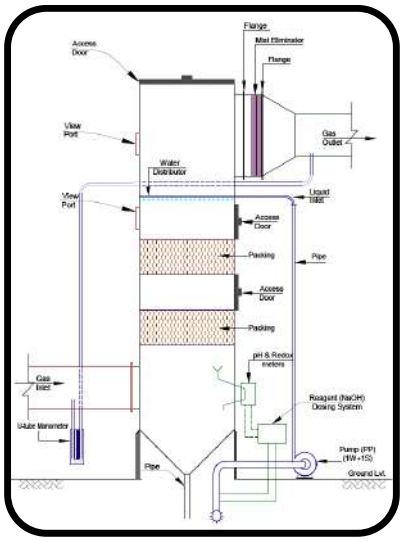
- Effective capturing of sub micron particles thus effectively eliminating black smoke.
- Dust removal efficiency : >95%.
- Special Fiberglass bags with PTFE coating to withstand high temperature of flue gases.
- Automatic reconditioning of bags by compressed air.
- Technology cost: Rs. 20-25 lakh (for 6 TPH boiler).

## APCD Process Flow Diagram



## B) Tech. Intervention for industrial unit using Pet-coke as fuel

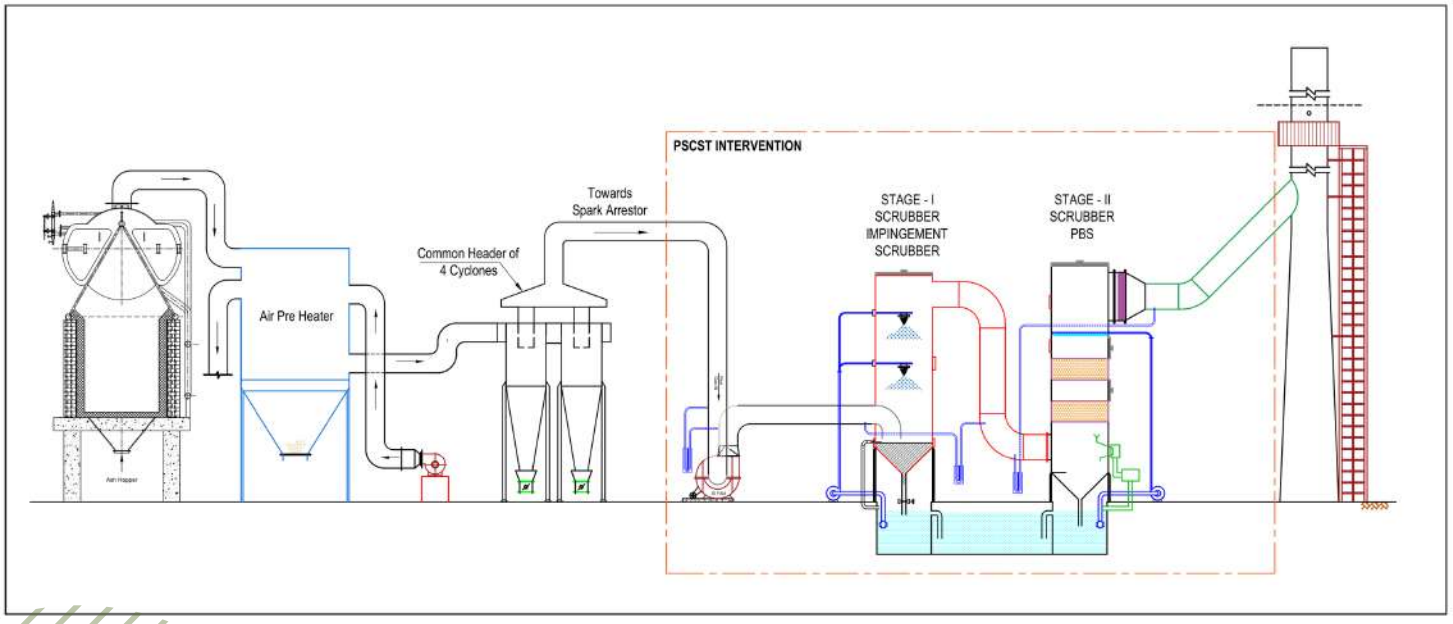
Two stage scrubbing technology has been demonstrated at M/s Shri Balaji Finishing Mills Pvt. Ltd., Ludhiana for control of particulate and $SO_2$ emissions from pet coke fired boiler. Packed bed scrubber removes gaseous pollutants by inertial or diffusional impaction, reaction with a sorbent, or absorption into liquid solvent. Pet-coke has higher sulfur levels as compared to other fuels, which results in higher $SO_2$ emissions. The $SO_2$ emissions not only affect the environment, historical monuments but also human health. A few of the ill effects of $SO_2$ on human health includes coughing, wheezing, phlegm and asthma attacks.




Salient features of demonstrated technology are:

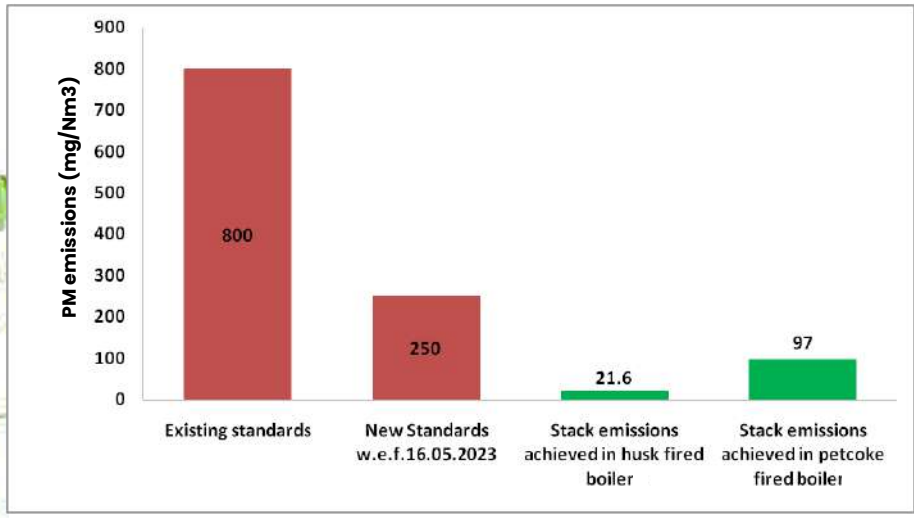
- Two stage gas scrubbing technology i.e. Impingement type followed by Packed Bed Scrubber.
- Ceramic based raschig rings used in packed bed scrubber.
- Low Pressure drop across system leading to lesser power requirement for ID fan.
- $SO_2$ removal efficiency : >90%.
- Technology cost: Rs. 15-20 lakh (for 8 TPH boiler).

### APCD Process Flow Diagram

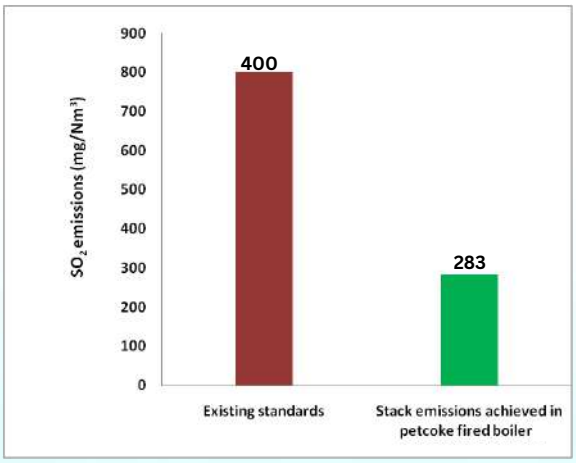


# ENVIRONMENTAL BENEFITS

- Better work zone environment.
- Enhanced life of plant & machinery.
- Technology replication will contribute immensely in improvement of ambient air quality.
- Technology complying with revised stringent PM emission standards notified by MoEF&CC, GoI.




**Particulate Matter reduction with demonstrated technology in boilers**




**Sulphur Dioxide reduction with demonstrated technology in Petcoke based boiler**

## SOME HANDY TIPS TO IMPROVE FUEL FEEDING & FIRING PRACTICES

- Heavy fuel feeding be avoided.
- Fuel be fed at uniform rate coupled with adequate air for complete combustion of volatile matter thereby leading to reduction in soot/black smoke formation.
- $CO_2$ percentage in flue gases be checked daily to ensure optimal boiler operation & take corrective actions, if required.
- In case of pet coke as fuel, de-sulphurization at combustion stage (mixing of lime with pet- coke in the ratio 25:75) be carried out.
- Follow preventive maintenance measures of pollution control systems for efficient operations.

## REPLICATION POTENTIAL

The demonstrated Technology along with good operation & maintenance of the system has replication potential in around 300 textile dyeing units. Replication can result in capturing of particulate matter to the tune of 7500 tons/annum which is currently being discharged into the environment.


**This technology is poised to improve the Air Quality of the region, fostering a healthier Punjab and its inhabitants by creating a cleaner living environment, thus enabling State in achieving higher scores on the SDG India Index.**

**TECHNOLOGY DEVELOPMENT & DEMONSTRATION HAS BEEN CARRIED OUT BY PSCST WITH THE SUPPORT OF MISSION TANDARUST PUNJAB, DIRECTORATE OF ENVIRONMENT & CLIMATE CHANGE, GOVT. OF PUNJAB**

## ABOUT PSCST

The Punjab State Council for Science & Technology (PSCST) was set up in 1983 under State Department of Science & Technology. It serves as think-tank of Department of Science, Technology & Environment, Govt. of Punjab and State level node of Department of Science & Technology, Govt. of India. PSCST is recognized as Scientific & Industrial Research Organization (SIRO) by Department of Scientific and Industrial Research (DSIR), Govt. of India.

The Council has experience of working for addressing energy & environmental challenges of MSMEs of the State since last three decades. It has demonstrated & facilitated technologies for air pollution control to more than 1200 industries leading to reduction of 44,000 tons of SPM as well as 21,500 tons of GHG emissions in last 5 years. The Council has been conferred with Action Award 2020 for Environment Sustainability by UNDP & Govt. of Punjab.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