



Flue gas cleaning Waste-to-Energy power plant

Exeter, UK



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Introduction

DP CleanTech opened its specialized Flue Gas Cleaning division in Essington, Wolverhampton UK in September 2011. With global emissions standards for biomass and waste-to-energy power plants becoming increasingly strict, DP CleanTech set up a separate specialized division to ensure the environmental credentials of all DP plants, as well as help other power plant owners meet local emissions standards.

In early 2012, DP CleanTech was awarded the contract to supply the Flue Gas Treatment system for Devon County Council's first waste-to-energy power plant in Exeter. The new 3MWe plant in Exeter will convert 60,000 tons of Devon's municipal solid waste into renewable energy and help the county achieve its Landfill Allowance Target set by the UK government. The plant also acts as an important example for other local authorities to follow and speed up the process for moving England towards a zero waste society.

Requirements

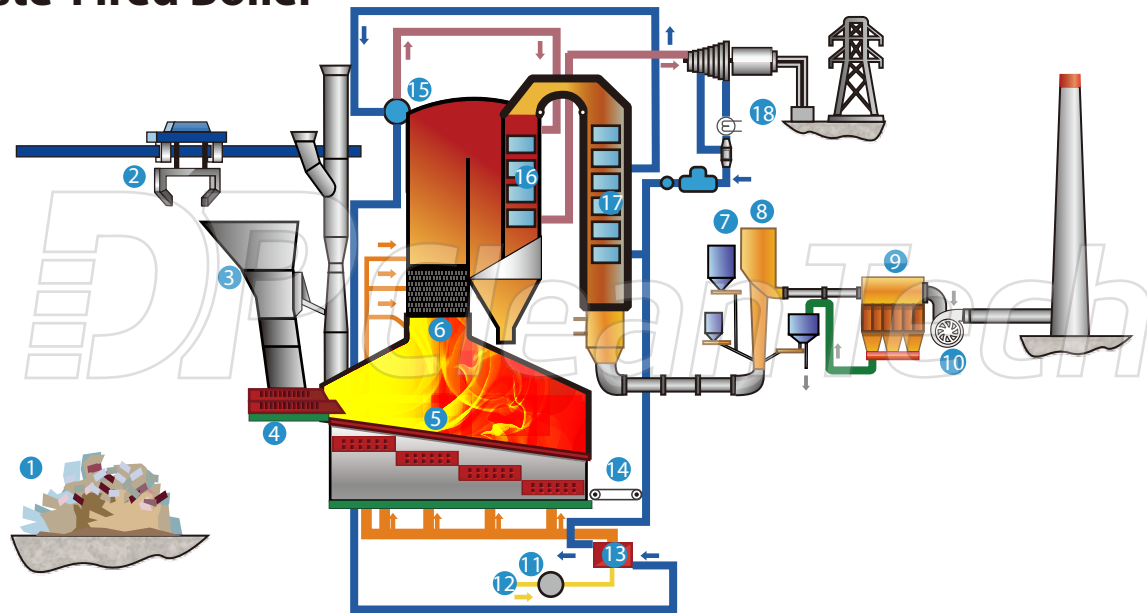
Tiru Group SA is responsible for the overall delivery of the waste-to-energy plant on an EPC basis. Tiru Group is one of the largest EPC contractors in Europe, specializing in household waste management and energy recovery. Tiru contracted DP CleanTech to supply the Flue Gas Cleaning System due to their unique cost effective solution. DP were contracted to design, manufacture, install and commission the complete Flue Gas Treatment system.



Flue Gas Cleaning

The combustion of solid wastes, such as municipal or industrial waste, or RDF (Refuse Derived Fuel), generates flue gases that contain pollutants. The composition of flue gas depends on the chemical make-up and the preparation of the waste, as well as the operating parameters of both the furnace and the energy recovery boiler. Typically, the following categories of pollutants are present in the flue gas before cleaning: acid components, dust, heavy metals, nitrogen oxides, polyaromatic compounds (dioxins, furans, PCB, etc) and products of incomplete combustion (CO, CxHy, etc). To prevent their release and ensure compliance with the prevailing legislation, the installation needs to be equipped with a highly efficient flue gas cleaning system.

Waste-Fired Boiler



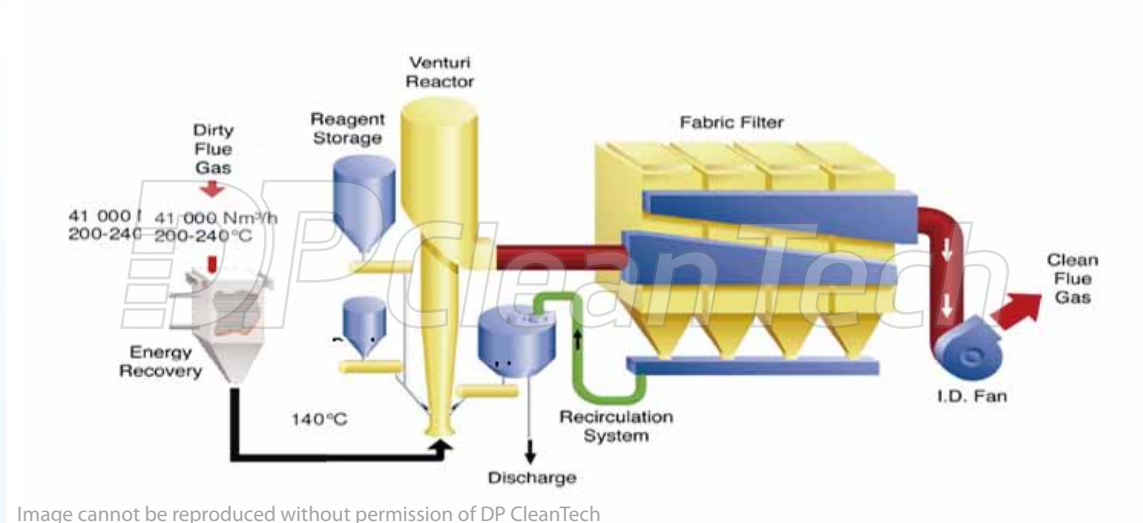
- | | | | |
|------------------|----------------------|--------------------------|----------------|
| 1 Waste bunker | 6 Combustion chamber | 11 FD fan | 16 Superheater |
| 2 Crane | 7 Reagent storage | 12 Combustion air intake | 17 Economizer |
| 3 Feeding hopper | 8 Venturi reactor | 13 Air preheater | 18 Condenser |
| 4 Pusher | 9 Bag filter | 14 Slag conveyor | |
| 5 Step grate | 10 ID fan | 15 Steam drum | |

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DP Solution

DP CleanTech's Flue Gas Cleaning team has extensive experience in redefining complex requirements in order to deliver specialized solutions, and has a proven track record in delivering reliable and cost effective systems for meeting emissions standards all over Europe.

DP CleanTech's Dry Scrubbing System is a highly flexible and cost effective system for the cleaning of flue gas and is designed to meet the most stringent emission limits. The system is based on the injection of hydrated lime and activated carbon in a reactor tower and on the recirculation of the residues collected in the fabric filter. The residue recirculation allows for a large amount of reactant/reagent (unreacted lime and activated carbon) in the system, improving performance and decreasing the reactant consumption, resulting in very low emissions.



Process Description

Before entering the reactor tower, the flue gas is cooled down to about 140°C. In the reactor tower, the flue gas is brought into close contact with the reagent (hydrated lime and activated carbon), gaseous acid components (HCl, SO_x), heavy metals, dioxins, furans and other volatile organic compounds are partially removed. On the bags of the filter, the trapped particles form a dust cake allowing the neutralisation and absorption reactions to be completed.

On a regular basis the bags are cleaned and the dust cake is collected in the filter hoppers. The captured product is recycled back to the reactor tower via a recirculation surge hopper and a screw conveyor. A second conveyor allows the product to be directed to a conveying system which transports the product to a residue silo. The residue silo is designed to discharge product via a loading chute into trucks after humidification. The treated flue gas exits the filter at a temperature of approximately 135°C and is finally discharged through the stack.

Benefits

- Limited investment cost
- Ease of operation and minimal maintenance cost
- Minimal number of moving parts
- No water consumption
- Minimal plume formation
- Reactor tower for optimum contact
- Recirculation of residue for reduced reagent consumption
- Very high flexibility to cope with inlet pollutant peaks