



# ENERGY PLANT

Multi-media energy solution tailored for your needs

# Conserving Resources, Preserving the Future.

Thermax provides systems and solutions in the critical domains of energy and environment. The products and services developed by Thermax help industries achieve better resource productivity and improved bottom lines, while maintaining a cleaner environment. The company's vision for the future is firmly anchored in the belief that, to stay competitive, business houses need to adopt sustainable practices.

Thermax's product portfolio covers heating, cooling, water and waste management, and specialty chemicals. The company also designs, builds and commissions large boilers for steam and power generation, turnkey power plants, waste-to-energy systems and air pollution control projects.

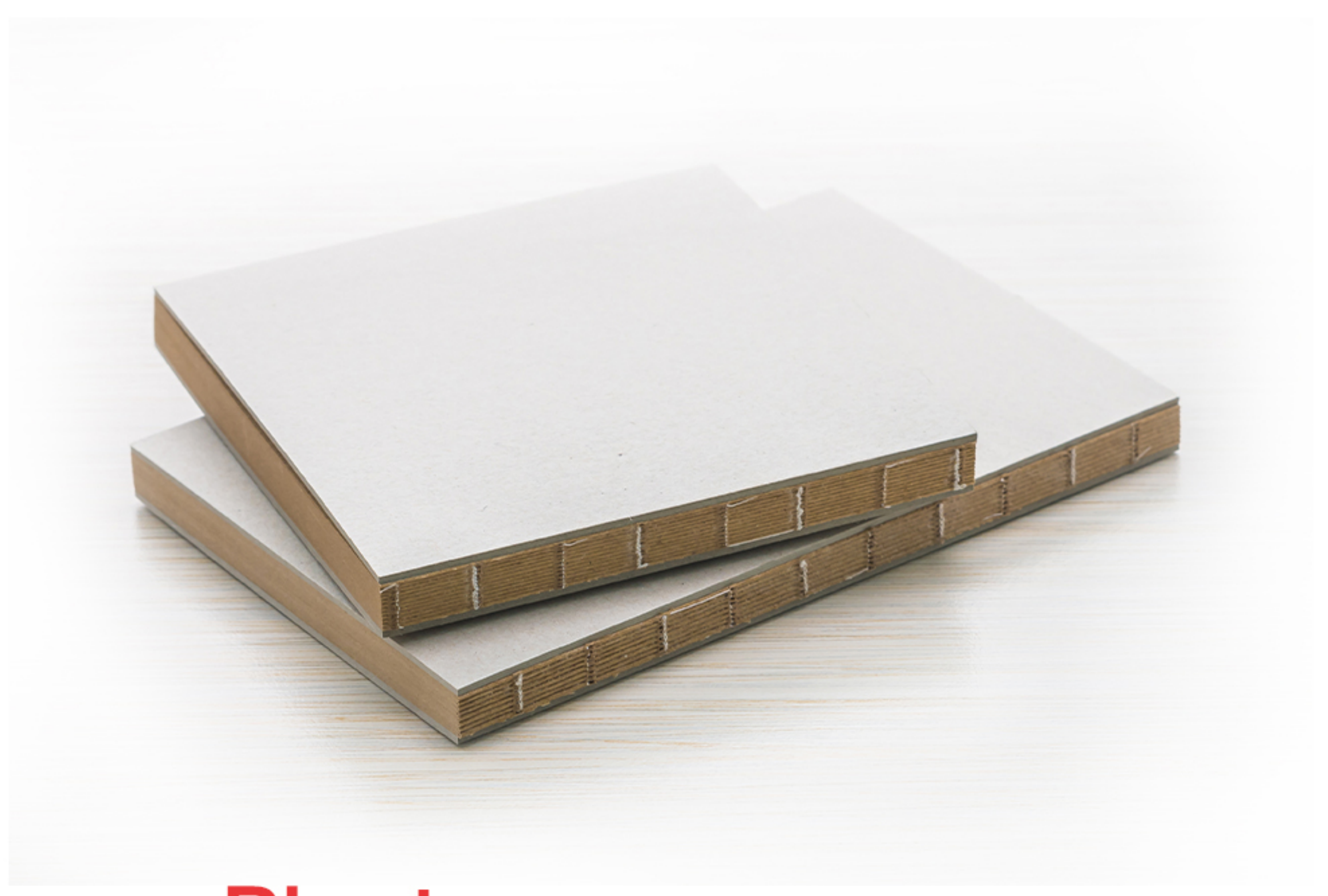
## The Need for an Integrated Energy Solution

The Engineered Wood Industry, including Medium Density Fibreboard (MDF) and Particle Board manufacturing, requires continuous steam, thermal oil, and hot gas at different production stages. Meeting these diverse energy needs with multiple systems increases infrastructure complexity, operational costs, space requirements, and maintenance efforts. A more streamlined approach is essential to enhance efficiency and sustainability.

Additionally, these industries generate significant wood waste—such as sawdust, shavings, and offcuts—which, if not utilised effectively, adds to disposal costs and environmental concerns. This biomass holds potential as a fuel source, yet its integration into energy systems remains a challenge.

A solution that consolidates steam, thermal oil, and hot gas generation into a single system simplifies operations, reduces costs, optimises fuel use, and enhances overall energy efficiency. Eliminating multiple setups streamlines plant operations, improves thermal efficiency, and reduces downtime, leading to higher reliability and lower energy costs.

Furthermore, by using process waste as a fuel, manufacturers can enhance sustainability, reduce reliance on fossil fuels, and contribute to a circular economy—where waste is repurposed as a valuable energy resource.

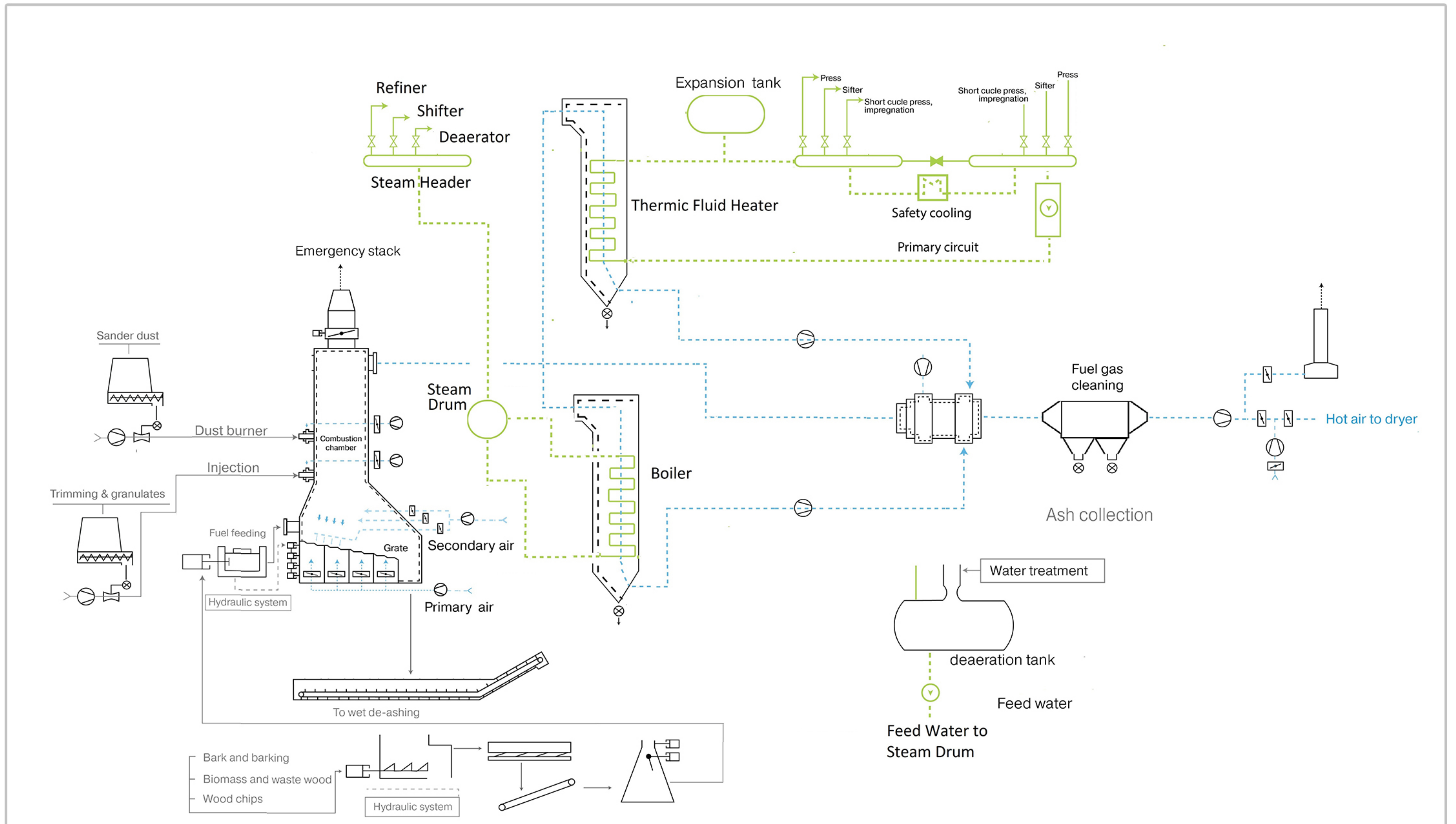


## Energy Plant

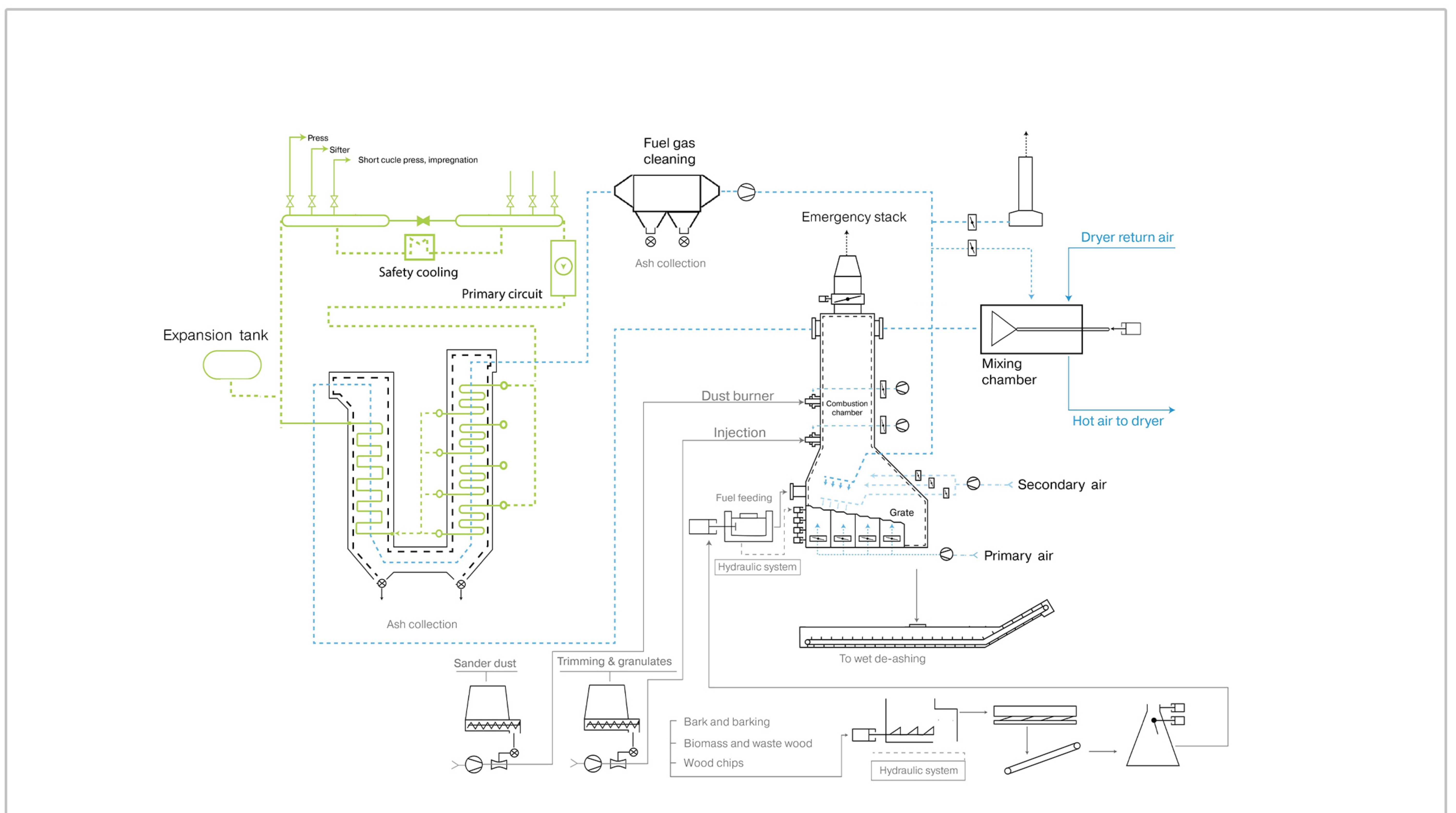
The Thermax Energy Plant is an innovative solution designed to provide multiple heating media—steam, thermal oil, hot water, and hot air—through a single, highly efficient system with thermal efficiency exceeding 94%. This system is engineered to maximise operating efficiency while minimising costs. The Energy Plant offers a comprehensive, tailor-made approach to meet diverse industry-specific energy needs. By utilizing process waste as fuel, it enhances sustainability, reduces operational costs, and deliver reliable process heat.

# Process Flow Schematic

## MDF PROCESS



## PARTICLE BOARD PROCESS



## Heater section

- The pressure part assembly consists of a membrane panel assembly, convection tube bank assembly with inlet and outlet headers, and interconnecting pipes
- The circulating thermic fluid passes through the membrane panel and convective pass tubes, where it absorbs heat from the hot flue gas
- The membrane panel and convective coils are designed with high velocity to reduce film temperature within safe limits
- The heater receives hot flue gas from the furnace, which passes through the membrane panel before entering the convective pass
- The hot flue gas transfers heat to the circulating thermic fluid in the convective sections

## Mixing chamber

- The mixing chamber collects hot flue gas from the furnace, relatively cooled gas from the boiler and heater streams, and cooling air through the cooling air nozzles
- Cooling air enters the chamber through high-velocity tangentially arranged cooling air nozzles
- The flue gas temperature at the mixing chamber outlet is regulated to the set temperature by adjusting the cooling air quantity

## Boiler section

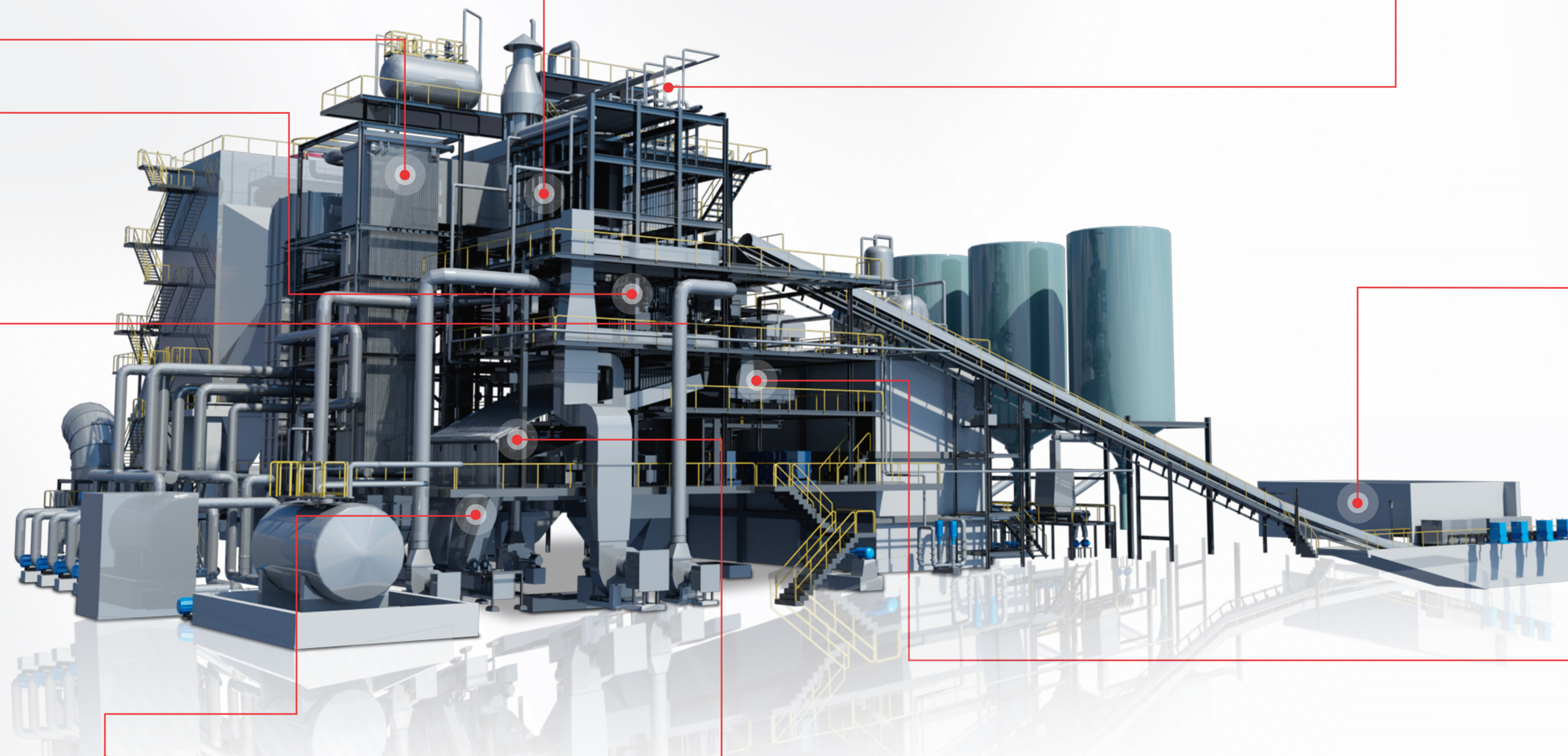
- The pressure part assembly consists of the steam drum, membrane panel assembly, convection tube bank assembly with inlet and outlet headers, and risers and downcomers
- Circulating water absorbs heat from the flue gas, evaporates, and rises as a water-steam mixture to the steam drum
- The steam drum is used to separate the steam-water mixture and supply saturated steam to the process
- The boiler receives hot flue gas from the furnace, which passes through the membrane panel before entering the convective pass
- Steam generation is controlled by regulating the flue gas flow rate using an ID fan with a VFD

## Furnace

- The furnace provides an enclosure for the combustor and ensures complete combustion of volatiles by providing appropriate time, temperature, and turbulence - 3Ts for combustion
- Usually made of refractory, this furnace is modified with a membrane panel design based on the minimum steam and thermic fluid energy demand specified by user
- Refractory material with excellent thermal resistance supports high-temperature combustion and flue gas generation. High refractory thickness minimises radiation loss
- High refractory thickness minimises radiation loss
- Secondary air nozzles increase turbulence and help in effective volatile combustion

## Sander dust burners

- Sander dust is injected into the furnace just above the grate, where it gets ignited due to the high furnace temperature



## Bed ash removal system

- Ash collected at outlet of the grate is collected in through wet ash conveyors
- Wet ash handling helps to avoid dusty area near ash disposal

## Reciprocating Grate

- Reciprocating Grate Combustion Technology, is transferred from the renowned Lambion GmbH
- This technology adeptly manages seasonal variations in fuel supply, ensuring consistent performance year-round
- It boasts high combustion efficiency with minimal unburnt residues, significantly reducing fuel costs and, consequently, operational costs
- Its robust and reliable design requires minimal maintenance, providing a dependable solution for various biomass combustion needs

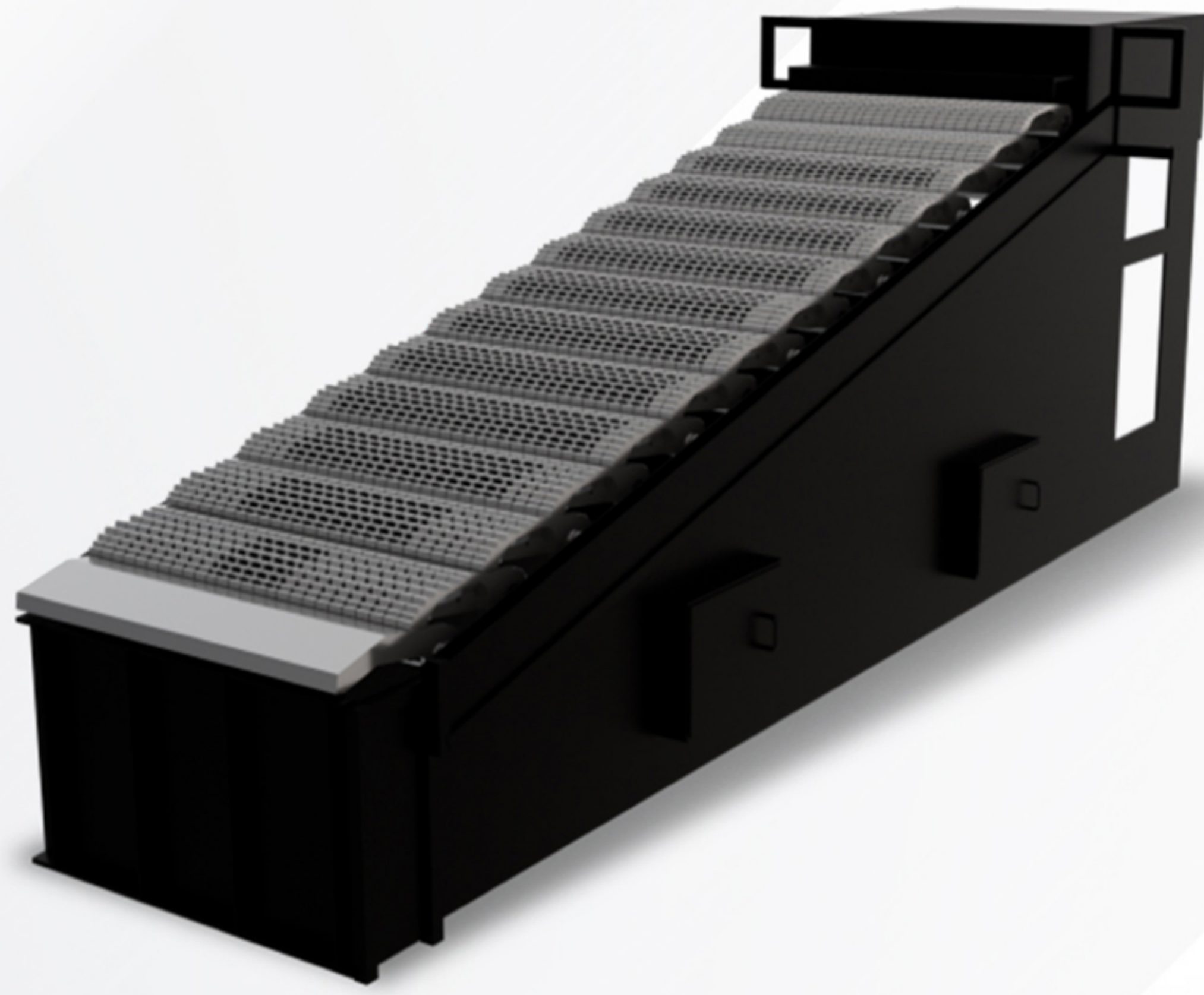
## Fuel handling system

- The moving floor receives, stores and delivers fuel through use of hydraulic operated ladder
- Ladders are constructed to ensure fuel movement towards handling system
- Belt or slat chain conveyor is used to transport fuel from moving floor to energy plant fuel feeding system

## Fuel feeding system

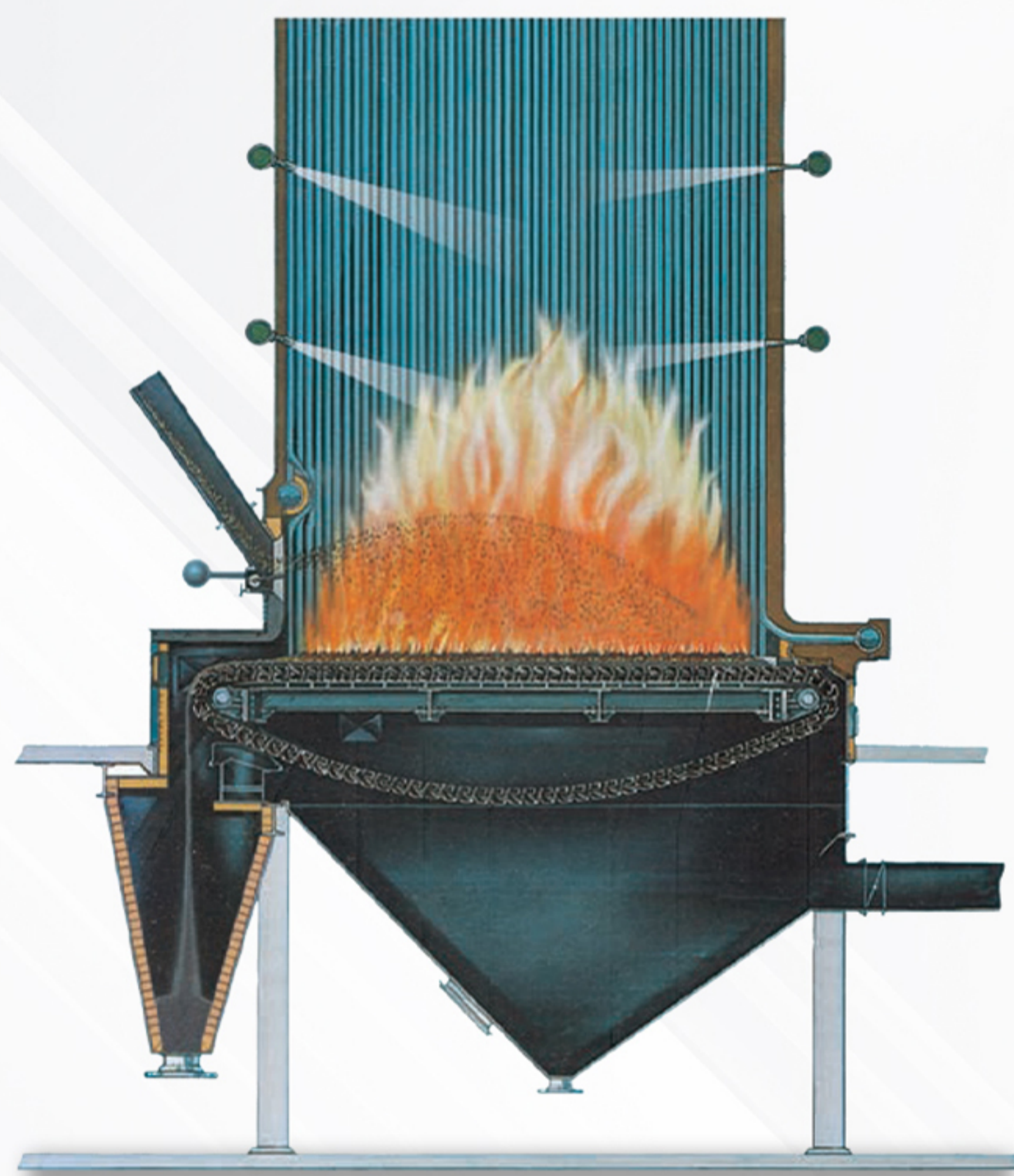
- Maintain fuel level over the ram assembly
- The stroke and speed of the pusher element are controlled by the hydraulic cylinder based on energy demand
- Hydraulic ram pushers enhance the fuel flexibility of the reciprocating grate due to their capability to handle and supply coarse, high-moisture, and low-bulk-density fuels to the combustor

# Combustion Technologies



## Reciprocating Grate

- ▶ Constructional features facilitate physical division of the grate into various combustion zones, with independent damper-controlled air connections to ensure optimal air distribution over grate
- ▶ Independent trolley movement in each zone, to suit combustion patterns of specific fuel to provide the required fuel flexibility for biomass combustion
- ▶ Zone-wise speed and air quantity variation provides flexibility to deal with seasonal changes in the fuel
- ▶ Unique grate bar design with multiple geometries and perforations helps achieve width-wise and length-wise air variation in a trolley, while the metallurgy of the grate bars ensures minimal wear and longer life



## Travelling Grate

- ▶ Travelling Grate front and rear air seals automatically minimize excess air within the furnace
- ▶ The curved grate design keeps sections closed without auxiliary weights when turning around sprockets, preventing gaps and directing foreign materials into the ash pit instead of the drive shaft
- ▶ Any grate section can be replaced without shutting down the stoker—simply remove a single bolt, nut, and washer to slide the grate off the carrier bar
- ▶ To reduce maintenance costs, the grate surface consists of short (230–300 mm) heavy-duty, heat-resistant cast iron alloy sections with uniformly spaced, tapered, self-cleaning air-metering openings and close-fitting overlapping edges to prevent air leakage

## Air pollution control

### Cyclomax

The Cyclomax is an arrangement of multi-cyclones. When dust laden gas enter the cyclone tangentially, the centrifugal force that develops due to the cyclonic action makes the dust particles move outward radially, they finally strike the wall and drop out of the gas stream into the hopper. Clean gas then flows out through the exit tube.

For boiler applications, Cyclomax enables achieving emissions as low as 300 to 350 mg/Nm<sup>3</sup>.

### Electrostatic Precipitators

Electrostatic Precipitators (ESP) is an arrangement of electrically charged electrodes. When dust laden gases enter the ESP through the inlet nozzle, dust particles get electrically charged by the emitting electrode. Due to the influence of this electrical field, these charged dust particles migrate to the grounded collecting electrode. The accumulated dust particles on the collecting plate are dislodged into the hopper due to periodic mechanical rapping. Clean gas then flows out through the outlet nozzle of the ESP. For boiler applications, the ESP enables achieving emissions as low as 50 mg/ Nm<sup>3</sup>.

# Key Installations

## Largest Energy Plant

97 MW Largest Energy Plant for an MDF Industry in South India



64 MW Energy Plant for an MDF Industry in West India



52 MW Energy Plant for an MDF Industry in South India



47 MW Energy Plant for an MDF Industry in South India



47 MW Energy Plant for an MDF Industry in North India



36 MW Energy Plant for a Particle Board Industry in South India



31 MW Energy Plant for an MDF Industry in North India



Conserving Resources,  
Preserving the Future.



Air Pollution  
Control



Boiler and  
Heater



Build-Own  
-Operate



Chemical



Cooling



Projects and  
Energy  
Solutions



Process  
Heating



Renewable  
Energy



Water and Waste  
Solutions

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