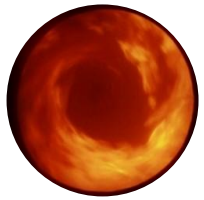




TORFTECH GROUP

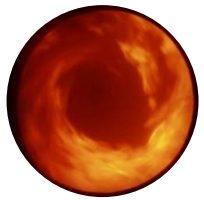
INDUSTRIAL PROCESSORS

Paper Mill Sludge Processing

February 2026






The TORFTECH Technology

Key points

Refined Design

Over three decades of global experience designing and supplying TORBED and TORWAVE processors for a range of applications

Accurate

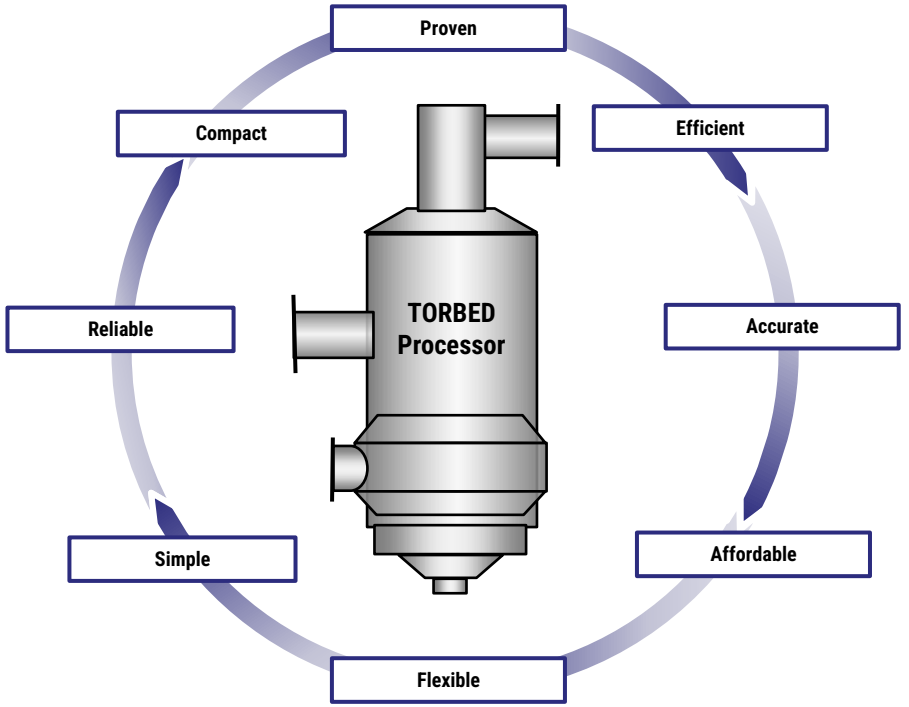
Close process control gives the TORBED processors unique abilities

Efficient

Small footprint, energy efficiency and remote operation capability often combine to offer potential for significant efficiencies

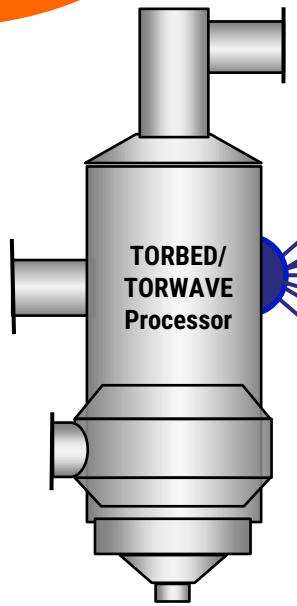
Energy Saving

Reduces energy consumption and capable of fossil fuel substitution in certain contexts



Markets

Paper sludge processing is just one of a broad range of established applications using the TORBED technology



SECTOR	APPLICATION
Food Manufacture	*Pasteurising, cooking, blanching, drying, roasting, toasting, puffing, expansion, baking.*
Sludge Processing and Disposal	*Drying, calcining, gasification, combustion, carbon removal, pasteurisation, devolatilization.*
Waste Processing and Disposal	*Drying, gasification, combustion, carbon removal, scrubbing, pasteurisation, devolatilization.*
Biomass Processing and Power Generation	*Drying, Torrefaction, Pyrolysis, Gasification, Combustion.*
Mineral Processing	*Bloating, exfoliating, expanding, roasting, drying, calcining, thermal shattering, carbon removal.*
Catalysts and Zeolytes	*Drying, impregnation, regeneration, recovery, calcination.*
Activated Carbon and BioChar Production	*Biomass and coal devolatilisation and activation, impregnation.*

Sludge treatment

The issues

Paper sludge arises naturally from the use of recycled paper in, among other things tissue manufacture.

Traditional means of disposal such as landfill or return to the land: 1) Produce unacceptable emissions. 2) Are being subject to regulatory prohibition. 3) Are becoming uneconomic.

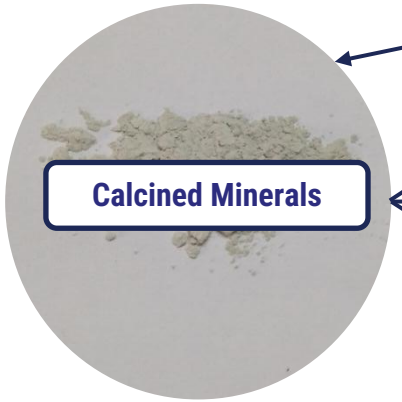
TORBED based drying and calcination systems offer cost-effective alternative approaches.

They can also produce by-products with value, thereby facilitating cost recovery.

Potential uses of dried paper sludge

Dried Sludge

- Absorbent Animal Bedding → Improved animal health → BUT → The dried sludge can cause microplastic contamination and it rots giving CH_4 emissions
- Direct Fuel → Eg for Cement Kilns, Brickworks etc
- Downstream Calcination → Steam and mineral production → Microplastics “destroyed”



Calcined Minerals

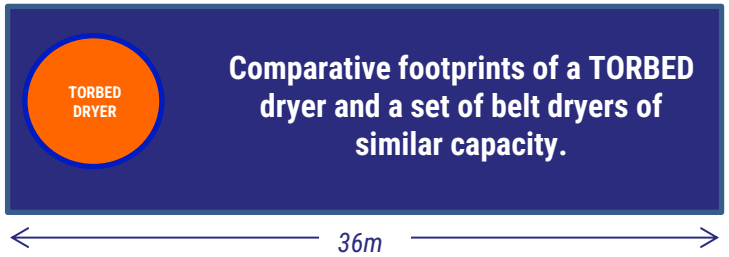
- Cement Replacement → CO_2 savings*
- Ready-mix Concrete → CO_2 savings*
- Precipitated Calcium Carbonate → Lower costs

*Calculations carried out at Torftech in 2020 based on production of cement, replacing 1 tonne of cement using the calcined material will result in a CO_2 saving of 845 kg.

Paper sludge treatment

Drying example: extracting value from waste

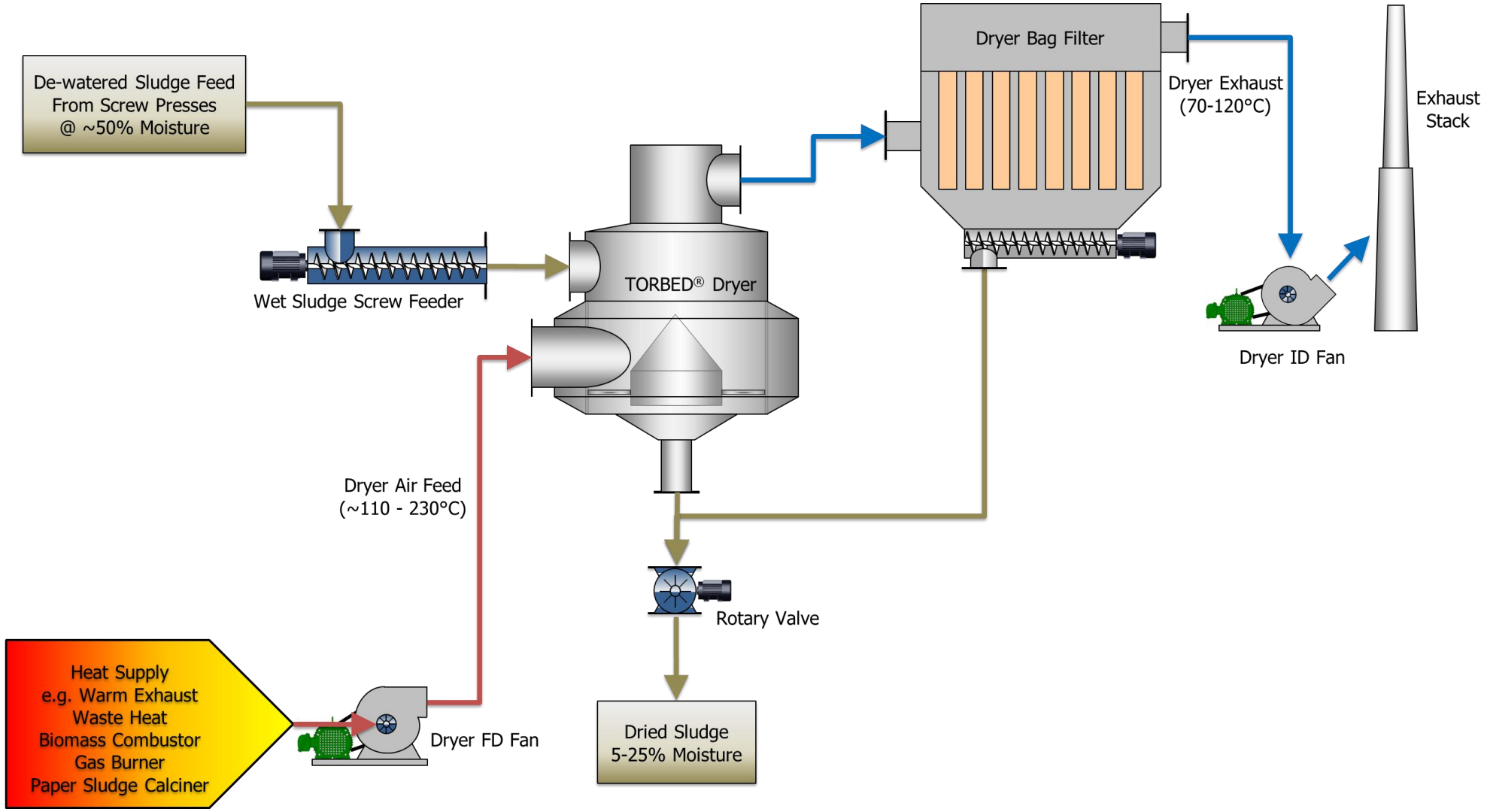
- TORBED T4500 triple ring dryer at a SAPPI Paper Mill in The Netherlands:
  - drying ~5 tons/hr of sludge for use as animal bedding;
  - from ~65% moisture to 5% moisture; and
  - using a waste energy source at 110°C (230°F).
- Has operated successfully since 2004.
- Dried sludge is used as animal bedding.
- Recently measured at 96% availability.
- Compared to the belt dryer it replaced, this TORBED dryer:
  - uses much less space and energy;
  - has greater availability;
  - costs less to operate and maintain; and
  - produces a more consistent product.



Paper sludge treatment

Typical drying process flow sheet

TORBED Dryers are flexible and can use low grade waste industrial heat, specially generated heat or heat from calcination of the dried paper sludge, creating a circular economy. It all depends on the objective of the process.



Paper sludge treatment

Dryer-Calciner pilot plant

- Combined dryer-calciner pilot plant
  - Commissioned and handed over Q1 2025
  - Feed of 250kg/hr of mixed paper sludge and plastic “rejects”
  - Drying reduces the sludge from 250kg to 130kg, which is then calcined.
- Produces 80kW of heat and a low carbon activated lime mineral that can be used as a substitute for cement in concrete.
- Energy from waste plus a useful by-product and savings from reduction in Landfill.
- The plant is designed to produce a significant quantity of the mineral so that it can formally certified.

Paper sludge treatment

Calcination examples

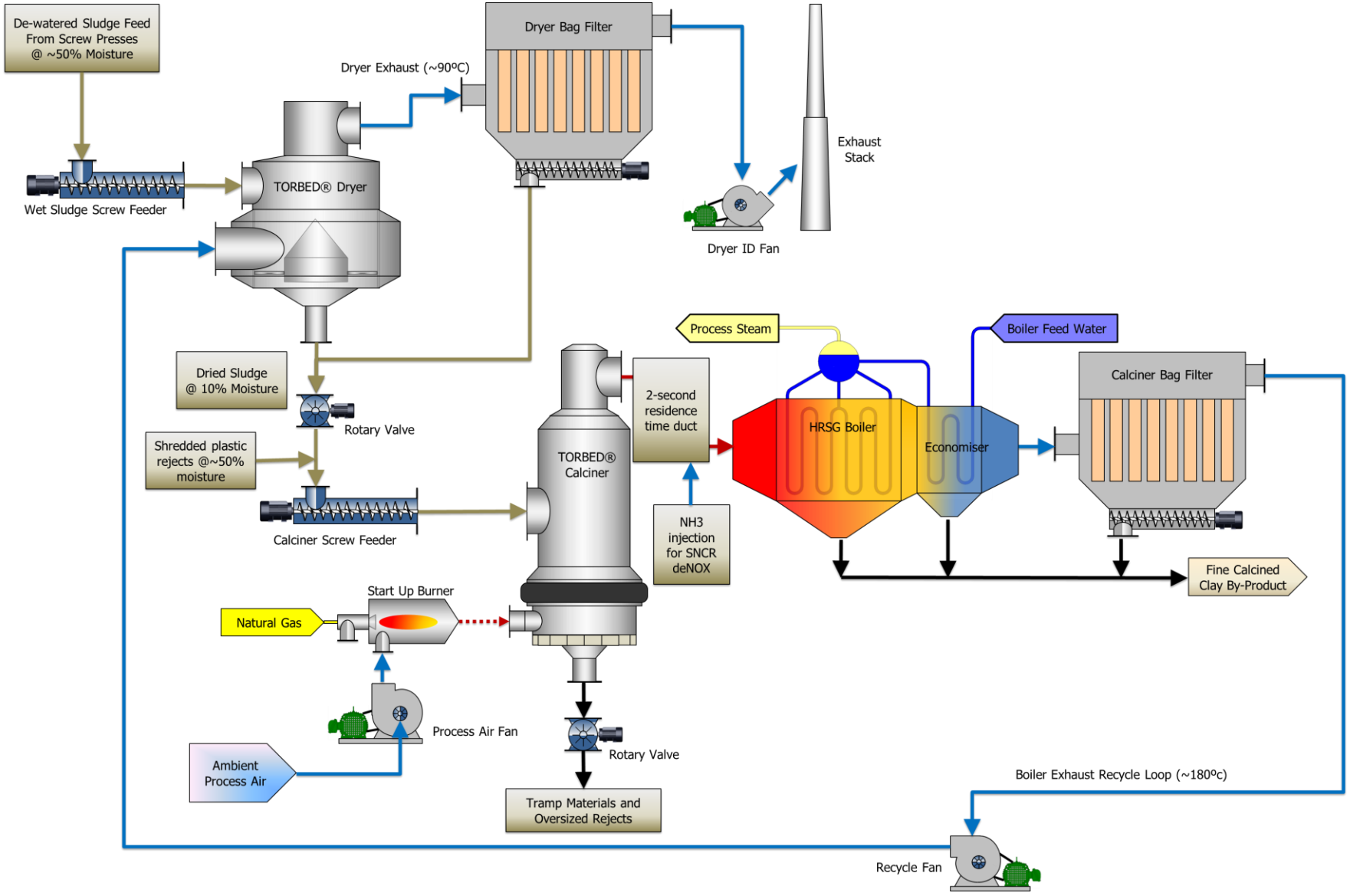
TORBED T1500 Calciner at Imerys UK fired by gas injection, operating at 1500ºC calcining clay for a paint additive – in operation since 2001.

TORBED technology in use calcining waste clay to create low carbon cement. Installed in 2025.

Paper sludge treatment

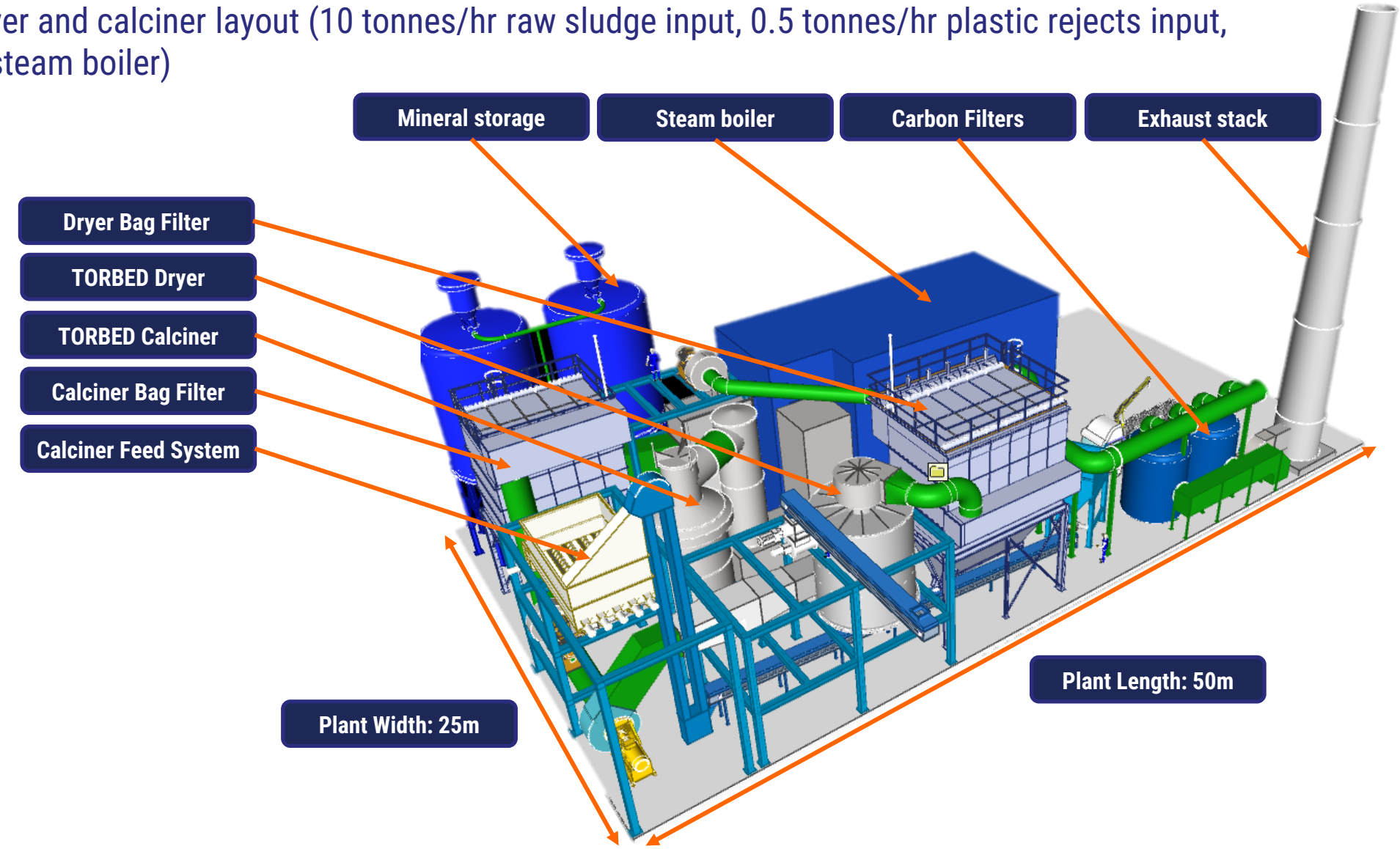
Process Flow Sheet with plastics

In this flow sheet, process steam is created by calcining the full amount of dried sludge produced, together with plastic rejects from the sludge stream, potentially increasing steam generation.



Paper sludge treatment

Typical TORBED dryer and calciner layout (10 tonnes/hr raw sludge input, 0.5 tonnes/hr plastic rejects input, 7 MW output from steam boiler)



Paper sludge treatment

Potential benefits from TORBED processor-based solutions

- **Reduction in costly fossil fuel energy inputs;**
- **No external heat source or energy required;**
- **Elimination of landfill costs and liability;**
- **Reduction in microplastic contamination;**
- **Waste treated at source;**
- **Reduction in carbon footprint;**
- **Low maintenance;**
- **Fully automated start-up, operation and shut-down.**

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