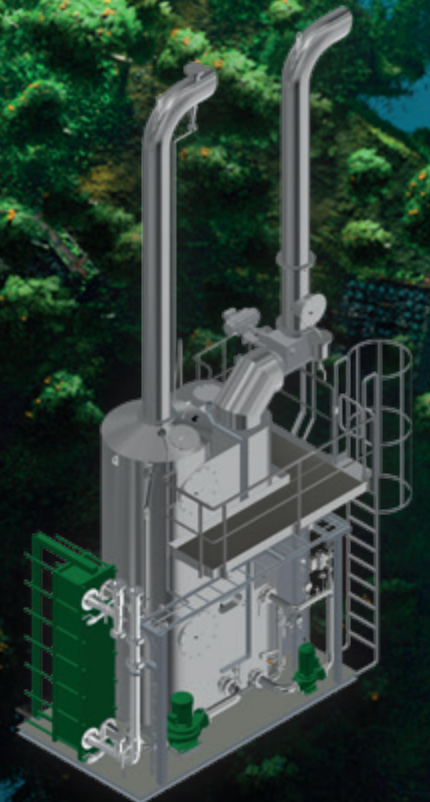


*'Caligo' and 'Industria' are Latin words. 'Caligo' means smoke, while, 'Industria' means energy or energetic activity.*



# CALIGO INDUSTRIA

C L E A N   E F F I C I E N C Y



CALIGO INDUSTRIA – INNOVATIVE PROVIDER OF TECHNOLOGICAL SOLUTIONS



INNOVATIVE PROVIDER OF TECHNOLOGICAL SOLUTIONS

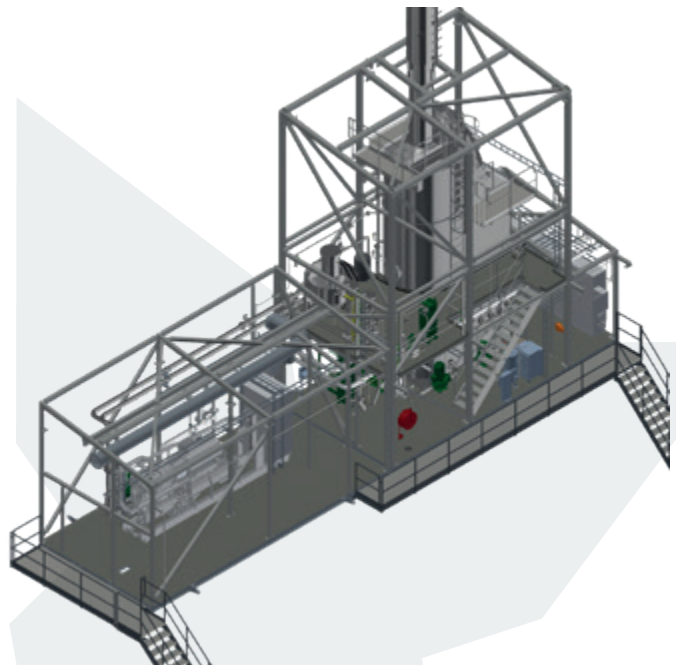
# INDUSTRIAL BY-PRODUCTS ARE VALUABLE AS ENERGY

We develop, market and sell product and system solutions for the purification of flue gases in the energy and processing sectors as well as for the utilisation of waste heat from processes. Our systems combine the theories of thermodynamics and fluid mechanics with our sizable body of experience in the practical challenges of the energy and processing sectors. The solutions that we deliver always include a consultation-based process of research, during which we will select the best-suited solution package from our line of products.

## HEATING SECTOR SOLUTIONS

The recovery and utilisation of waste heat in district heating networks is increasing, and it will play an even more important role in future energy production. Caligo Industria offers unique, patented solutions to take heat recovery efficiency to an entirely new level. Condensation technology recovers the waste energy from flue gases by turning steam back to water, releasing a significant amount of energy. The Caligo process yields more recovered energy by cooling the water down well below the dew point with the use of large industrial heat pumps. This allows for the condensation of more water and the release of considerably more energy than with traditional processes. At the same time, the heat production for district heating burns less fuel and offers higher efficiency. This also has a direct impact on carbon dioxide emissions.

- The Caligo flue gas scrubber is equipped with optimised heat recovery and washing functions. Owing to the taller washing zone, the washing takes longer than using a traditional scrubber, making it more effective at removing particles and acids.
- Each scrubber is a standalone unit with its own base, automation and optimised software.
- Full steel construction for fire safety. The types of steel that we use are extremely corrosion resistant.
- Factory-tested turnkey package. Installation on site will only take a few days.



### Benefits

- › UP TO 35% OF HEAT RECOVERED
- › 10 MW IN THE BOILER  
= 3.5 MW OF ADDITIONAL POWER
- › OR 35% LESS FUEL CONSUMPTION
- › 35% LESS BURNING
- › 35% LOWER CO<sub>2</sub> EMISSIONS



## INDUSTRIAL SOLUTIONS

Industrial manufacturing and processing that involves drying, frying or cooling (e.g. the drying of pellets or pulp or various food industry applications) releases waste steam. Whenever steam is produced, it collects energy. If the vapour is not condensed back to water, energy and water are being wasted.

Caligo's solution employs patented condensation technology to condense the waste steam and to recover its energy. The energy may be utilised in industrial processes or by connecting the heat recovery solution to a third-party heating network as possibilities permit. Caligo is available to assist in finding complete solutions for the benefit of all parties, when necessary.

The patented Caligo heat pump application is used to store heat in accumulators during weekdays when the industrial plant is operating. On weekends and during holidays, as the



### PATENTED HEAT ACCUMULATOR CONNECTION

process is shut down, the same heat pumps are also utilised to discharge the energy with high efficiency. In addition, the condensate water is returned to the industrial process. In the example case, the thermal power output is 6 MW, and the amount of water that can be returned into the process is approximately 30,000 m<sup>3</sup> per year.

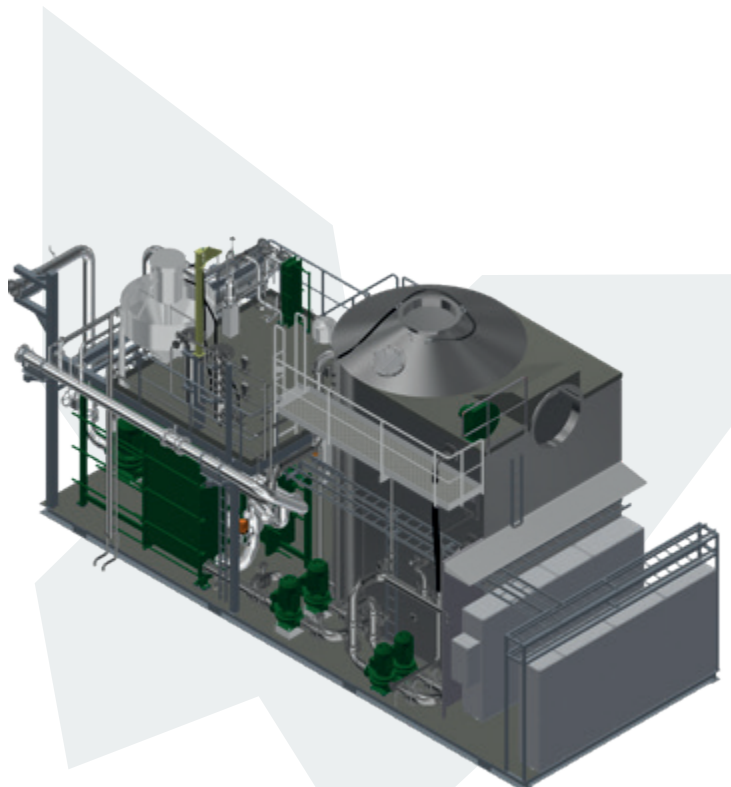
## SOLUTIONS FOR SAWMILLS

The waste heat from sawmill heating plants can be directly utilised by the sawmill's own processes. This provides sawmills with savings from the decreased need of supplied energy or the cost of a larger boiler, for example. Typical sawmill processes that are well suited for the flue gas scrubber include wood fuel driers (sawdust, chips and tree bark) or pellet driers. Caligo's condenser solutions enable the use of a boiler's left-over low-enthalpy heat to dry bio-fuel products.

Using a drier-connected solution, there is no need to acquire a new boiler with a dryer, as the old boiler can be fitted with a scrubber and then directly connected to the dryer. The dryer produces the sellable product, while the energy for the process is generated without significant fuel or operating costs. The scrubber's modular base also houses the necessary pumps as well as primer units for optimising the dryer's cycles, all taking advantage of the scrubber's automation. This saves space and reduces installation time and costs.

### Benefits

- › UP TO A 35% DECREASE IN BURNING A POTENTIAL PRODUCT
- › OR INCREASED PRODUCTION WITHOUT THE NEED FOR NEW BOILER INVESTMENT
- › MORE EFFICIENT BURNING
- › FEWER CO<sub>2</sub> EMISSIONS



### BASIC FLUE GAS SCRUBBER CSX B

CSX B is the basic Caligo scrubber unit. The basic unit includes a washing zone for flue gas particles and SO<sub>2</sub>, one heat recovery zone and condensate and sludge handling. Comes with its own base and self-contained automation.

We are a provider of technological solutions offering the state-of-the-art know-how of the sector with our innovative product solutions. Our systems combine theories in thermodynamics and fluid mechanics with a sizable body of experience in the practical challenges of the energy and processing sectors.

We offer our company's innovations and patented solutions with the quickest possible return on investment. All Caligo solutions are delivered as complete and standard units that have already undergone tests and trials as part of the manufacturing process. Caligo's solutions are also highly productised.

Costly field installation projects are no longer necessary.

Caligo Industria Oy's offices are located in Turku and Jyväskylä,  
and the production facilities are in Tampere.

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