SEPARATION

TURNING BIOGENIC WASTE RESIDUES INTO RENEWABLE BIOFUELS

ANDRITZ BELT DRYER FOR SLUDGE, BIOMASS, AND MSW/RDF

ANDRITZ

ENGINEERED SUCCESS

Alternative fuels as an option to serve the rising demand for energy are the main driver in the municipal waste and biomass markets. Waste volumes from municipalities (sludge and municipal solid waste) have been increasing globally due to rising population figures as well as the tighter legal environment. Sustainable use of biomass in the form of renewable fuel has also moved into greater focus. To increase the calorific value of municipal waste and biomass, and therefore use them as an efficient fuel, the correct treatment and valorization is key.

On the basis of its in-depth know-how, long-standing experience, and engineering competence, ANDRITZ has engineered solutions for waste-to-energy systems in fuel preparation processes such as shredding, screening, drying, and pelleting. Based on data from numerous installations globally, ANDRITZ improves and customizes the equipment for each application and can serve as a single interface for your entire sludge drying, biomass drying or MSW refuse-derived fuel (RDF) system, offering all process steps from one source.

Wet material silo

Utilizing waste heat with the ANDRITZ belt dryer

The ANDRITZ belt dryer is a medium to low-temperature dryer (depending on the application) designed to make efficient use of waste heat.

INCREASING THE CALORIFIC VALUE OF BIOFUELS

ANDRITZ has long been dedicated to supporting the global shift towards landfill reduction, green energy production and methane gas utilization. Whatever the moisture content, particle sizes or composition of biogenic feed material, our broad expertise and proven technologies can help you to achieve consistently high-quality results. Drying reduces the water content and improves the calorific value significantly. As a result of the drying process, less fuel input is required to generate energy, which also reduces emissions in downstream processes (e.g. combustion, gasification). ANDRITZ belt drying systems are characterized by single belt machines whereby the drying process for each product can be adapted exactly to the temperature profile or the gentle drying requirements. They are designed either with direct feeding or a simplified granulation system to achieve optimal dried product qualities.

PRINCIPLE

The ANDRITZ belt dryer is designed as a belt conveyor enclosed in a casing. The drying gases flow through the wet material, which is distributed evenly over the ventilated belt. As the belt is slow-moving, the drying gases are able to heat up the wet material and evaporate the water. The covered belt acts as a filter medium to prevent dust from generating inside the dryer. Whether you choose drying at low, medium or high temperature, the ANDRITZ belt dryer with its modular construction is an efficient means of fulfilling the requirements of your drying process.

BELT DRYER FEATURES FOR BIOFUELS

- Uses low to medium temperature energy
- Low moisture content achievable with low drying temperatures
- Customized control concept
- Control of wet material dosing
- Drying air volume adjustable
- Granulation and/or direct feeding system
- Water evaporation capacities typical from 600 kg/hr up to 30,000 kg/hr depending on feed material
- Even distribution of the wet feed across the belt

YOUR BENEFITS

- High thermal efficiency by minimizing heat losses
- High safety level thanks to detector devices and smart concept processes
- Simple and flexible: Simple operation with a high degree of automation, easy to adapt to different feed material types, minimal maintenance costs
- Multiple tie-in for waste heat options
- State-of-the-art emission levels
- Flexible to allow appropriate feed solutions for wet materials with different properties

Sludge drying for everyday challenges

Using natural gas or biogas, saturated steam, flue gases, warm water or thermal oil as heat source, the ANDRITZ belt dryer is ideal for using waste energy with low temperatures (e.g. 80 °C warm water).

MULTIPLE POTENTIAL USES

After a dewatering stage, sludge drying is recommended in order to upgrade the sludge and make better use of certain advantages:

- Significant reduction of sludge weight and volume, resulting in lower costs for disposal and transport and easy storage handling
- Increase in calorific value, generating valuable fuel to replace fossil energy sources
- Low-odor material that is less harmful and dangerous to human beings, less air pollution
- Multiple disposal or recycling options for end product (fuel, fertilizer)
- Nutrient recovery possible

BELT DRYER FEATURES FOR SLUDGE

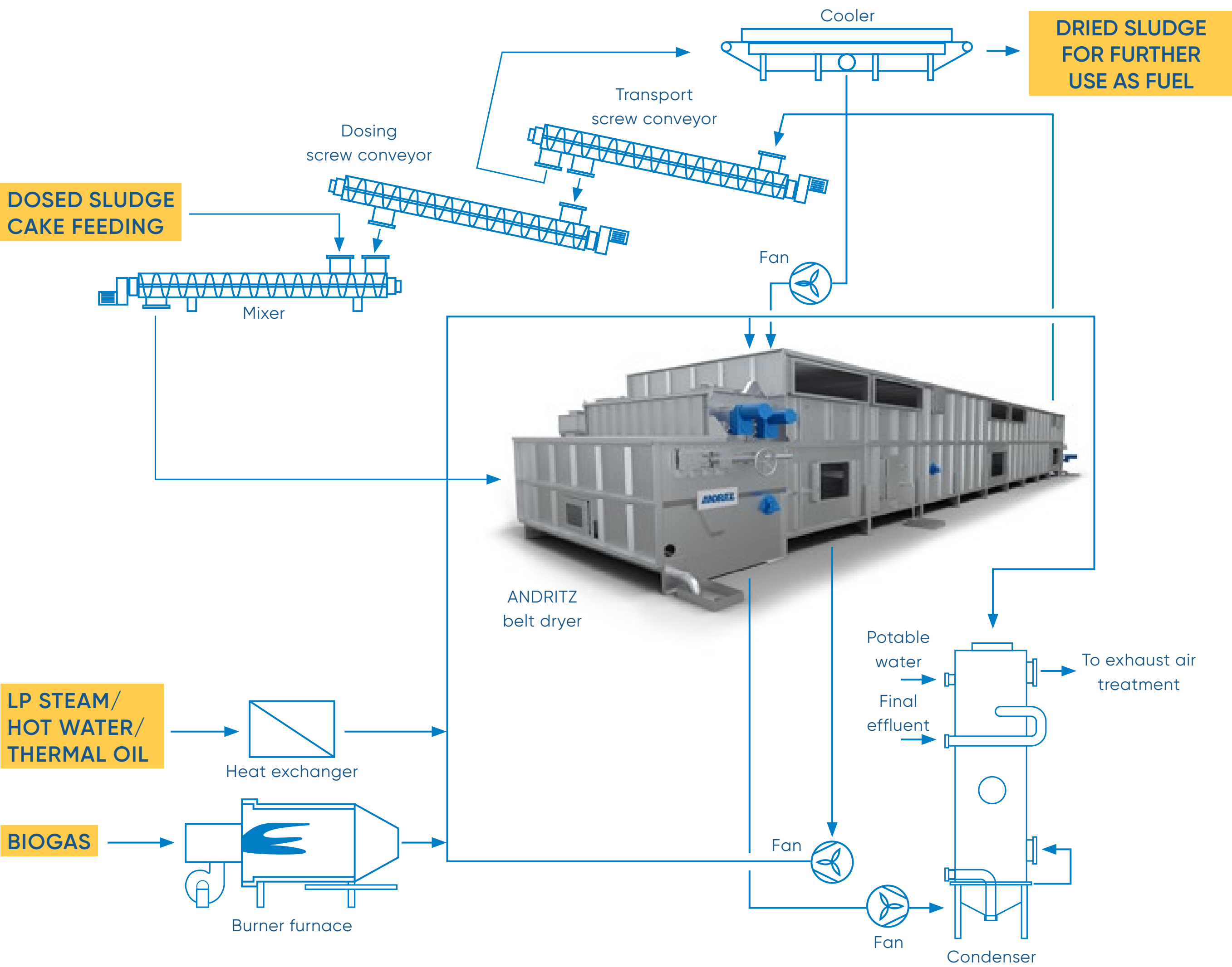
- Low-temperature belt dryer, flexible thermal heat supply by direct and/or indirect heating
- Closed air loop
- Fully dried product > 90% DS
- Sludge preparation with simple and/or advanced granulation (classification of particles)

Typical water evaporation	**600 kg to 10 tons per hour**
Capacity	150–2,575 kg DS/hour when drying from 20% DS to 90% DS
Belt width	Up to 6 m
Belt length	Up to 42 m
Active belt area	Up to 244 m^2

ANDRITZ belt dryer installation for sludge drying

YOUR BENEFITS

- High and even dryness of final product as well as avoidance of sticky phase due to advanced granulation system
- Granular product, low dust content
- Bulk density ≥ 500 kg/m³
- Compliant with EPA 501 rules
- Granules, no wet core
- Due to substantial reduction of volume and mass, significantly lower costs for disposal and transport
- Biologically stable product properties
- ATEX-compliant



Principle of drying with belt dryer

Saving costs and increasing energy production for biomass

ANDRITZ supplies the complete process for biomass drying, from wet material handling to wet milling – all from a single source. The ANDRITZ product portfolio for biomass also includes complete woodyards, chippers to produce wood chips, grinders, pellet presses, and biomass-fired power stations, including energy generation.

BIOMASS AS AN ENERGY SOURCE

In most cases, biomass (bark, wood chips, sawdust) has to be dried before being used in pelleting, briquetting, incineration, and gasification. By drying biomass with a belt dryer, the water content is reduced, the calorific value increases from 2 kWh/kg to approximately 4.5 kWh/kg. This cuts the transport and storage costs as well as creating ideal conditions for direct firing or optimum pelletizing properties, both for industrial and for high-grade wood pellets. As a result of the drying process, less fuel input is required to generate energy, which also reduces the pollutant emissions caused by the firing process. The demands made on the drying process are high because a very constant and very low moisture content is required. Due to its special concepts for open, hybrid and closed air loops, thermal efficiency is high while electricity consumption remains quite low.

Typical water evaporation	**3 to 30 tons**
Capacity	3.4 to 34 t DS/hr when drying sawdust from 50% moisture content to 10% moisture content
Active belt width	Up to 8 m
Active belt length	Up to 60 m
Active belt area	Up to 480 m^2

BELT DRYER FEATURES FOR BIOMASS

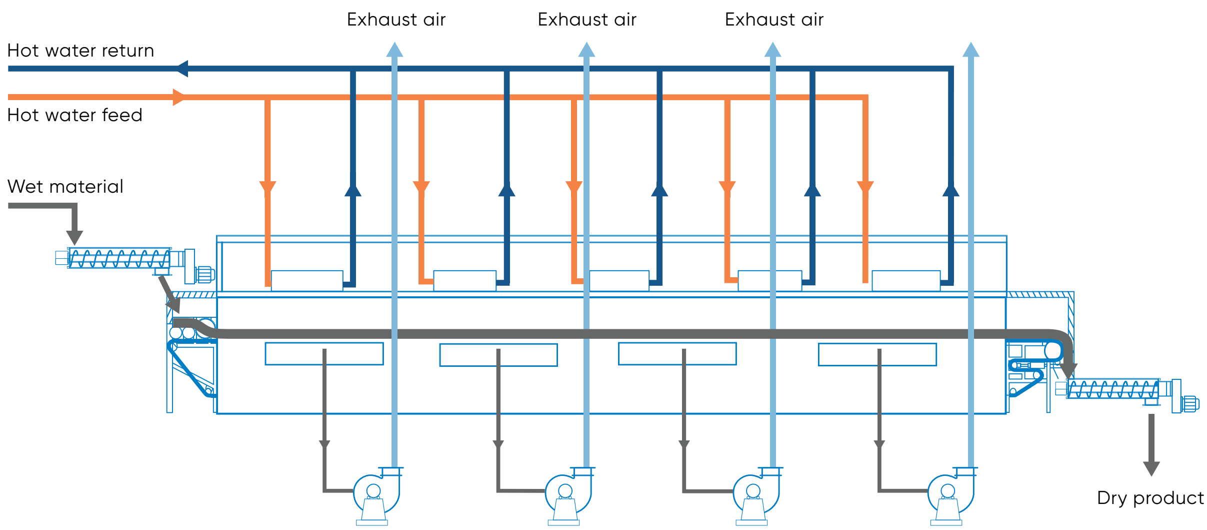
- Solid, modular steel structure
- All screw conveyors and built-in parts designed for easy removal
- Adjustable feed modules for different biomass particle sizes and with optional frost protection allow variable settings
- No rotating parts to support the belt in the dryer housing, thus longer lifecycle for parts and less wear
- Belt supported on steel strips to prevent material accumulations
- Water-saving solution for automatic belt cleaning
- Easy belt filter replacement due to endless clipper seam
- In order to optimize energy efficiency and minimize exhaust air volume, the drying system can be designed optionally for partial or full air circulation

Biomass drying solutions for wood residues

ANDRITZ belt dryer installation for biomass drying

YOUR BENEFITS

- Flexibility in processing different biomass qualities and mixtures
- Uses various low-temperature energy sources, including waste heat
- Low thermal and electrical energy consumption
- Low emissions (dust, VOCs, exhaust gases), environmentally friendly
- High safety standards (fire/explosion protection, interlocks, etc.)
- No primary energy or thermal energy costs for drying and no additional CO_2 emissions
- Higher calorific value
- Maximum drying air temperature of 110 °C



Flow of heat, water and air in an ANDRITZ belt dryer for biomass

ANDRITZ belt dryers are designed with high safety standards

How can a city's sewage plant produce valuable alternative fuel products?

For decades, the dewatered sewage sludge in Zyrardów, a Polish town near Warsaw, was only suitable for agricultural use or landfill. This all changed with a new belt drying system (BDS) from ANDRITZ.

The cost-efficient BDS delivers over 90% dry solids with low dust content. It was also customized with a simplified granulation system that helps reduce the mass of the plant's sewage sludge by 95%. It can even produce fully dried granulate, meeting environmental requirements while facilitating valuable products for alternative fuel.

What's more, modifying the high-performance technology to meet the plant's specific needs posed no barrier to the short delivery time. Are you interested in making your operations more sustainable as well? Ask your separation specialist.

Converting trash to treasure with the ANDRITZ belt dryer for refuse-derived fuel (RDF)

Refuse-derived fuel (RDF) is an alternative fuel produced by shredding, sorting and separating the light fraction of solid waste (MSW), such as plastic packaging, paper industry rejects, household waste, and so on. The objective of this concept is to obtain stable material with a homogeneous, low moisture content and high calorific value. A well-proven and highly efficient drying process turns the wet RDF into a valuable energy source for further gasification, combustion, or densification.

RDF drying is used in various industries to valorize waste:

- On site in an integrated thermal conversion device
- Off site at a remote facility
- Co-combustion in coal-fired boilers
- Co-gasification with coal and biomass
- Co-incineration in cement kilns

When drying RDF, it is important to focus on two criteria impacting the feed system: particle size (10-100 mm) and impurities content, as even after passing through magnetic separation units, the fractions still contain impurities. These two criteria impact the feed system. In response to these challenges, ANDRITZ has developed a special feeder belt for even distribution of wet RDF. In addition to the belt dryer, ANDRITZ supplies specific technologies, processes, and equipment for RDF. This includes equipment for shredding, screening and classification as well as drying and in some cases pelleting. The result is a valuable product such as RDF with high calorific value as well as non-combustible fractions.

Water evaporation	to 25 t/h
Capacity	1 t DS/hr to 50 t DS/hr
Active belt width	Up to 8 m
Active belt length	Up to 60 m
Active belt area	Up to 480 m^2

BELT DRYER FEATURES FOR RDF

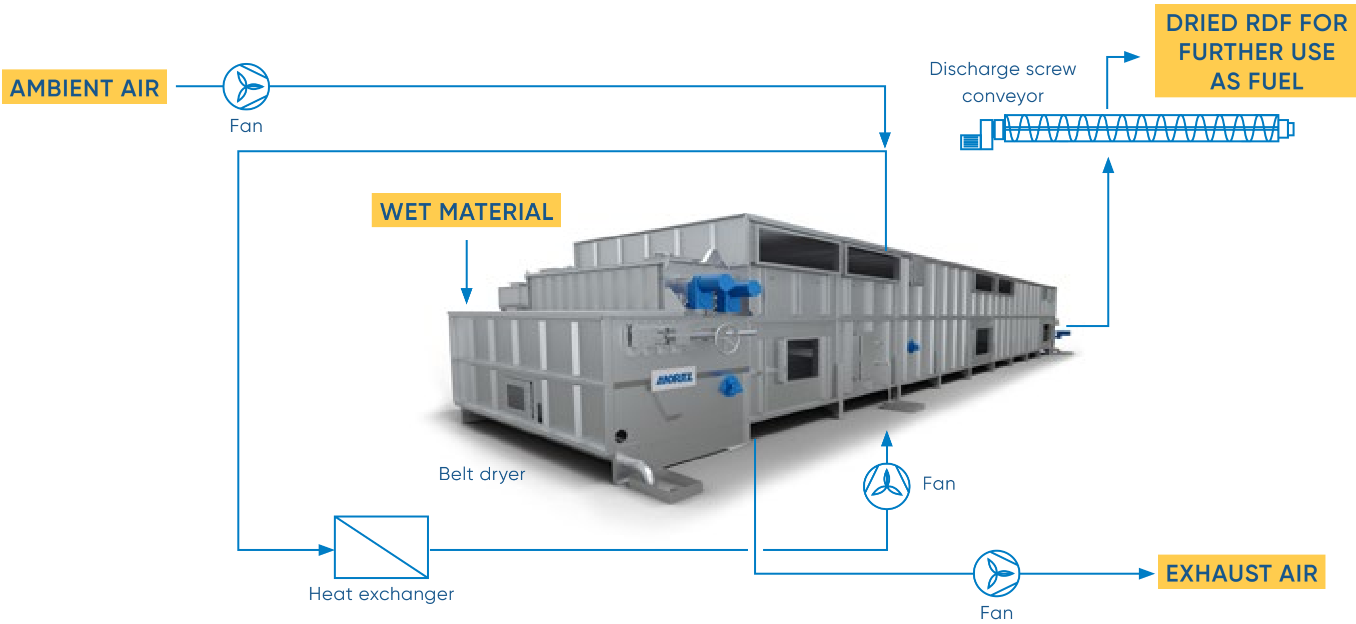
- Solid, modular steel structure
- All screw conveyors and built-in parts designed for easy removal
- Adjustable feed modules for different RDF particle sizes and with optional frost protection allow variable settings
- No rotating parts to support the belt in the dryer housing, thus longer lifecycle for parts and less wear
- Belt supported on steel strips to prevent material accumulations
- Water-saving solution for automatic belt cleaning
- Easy belt filter replacement due to endless clipper seam
- In order to optimize energy efficiency and minimize exhaust air volume, the drying system can be designed optionally for partial or full air circulation

Turning trash into valuable energy with ANDRITZ belt dryers

ANDRITZ belt dryer for refuse-derived fuel (RDF)

YOUR BENEFITS

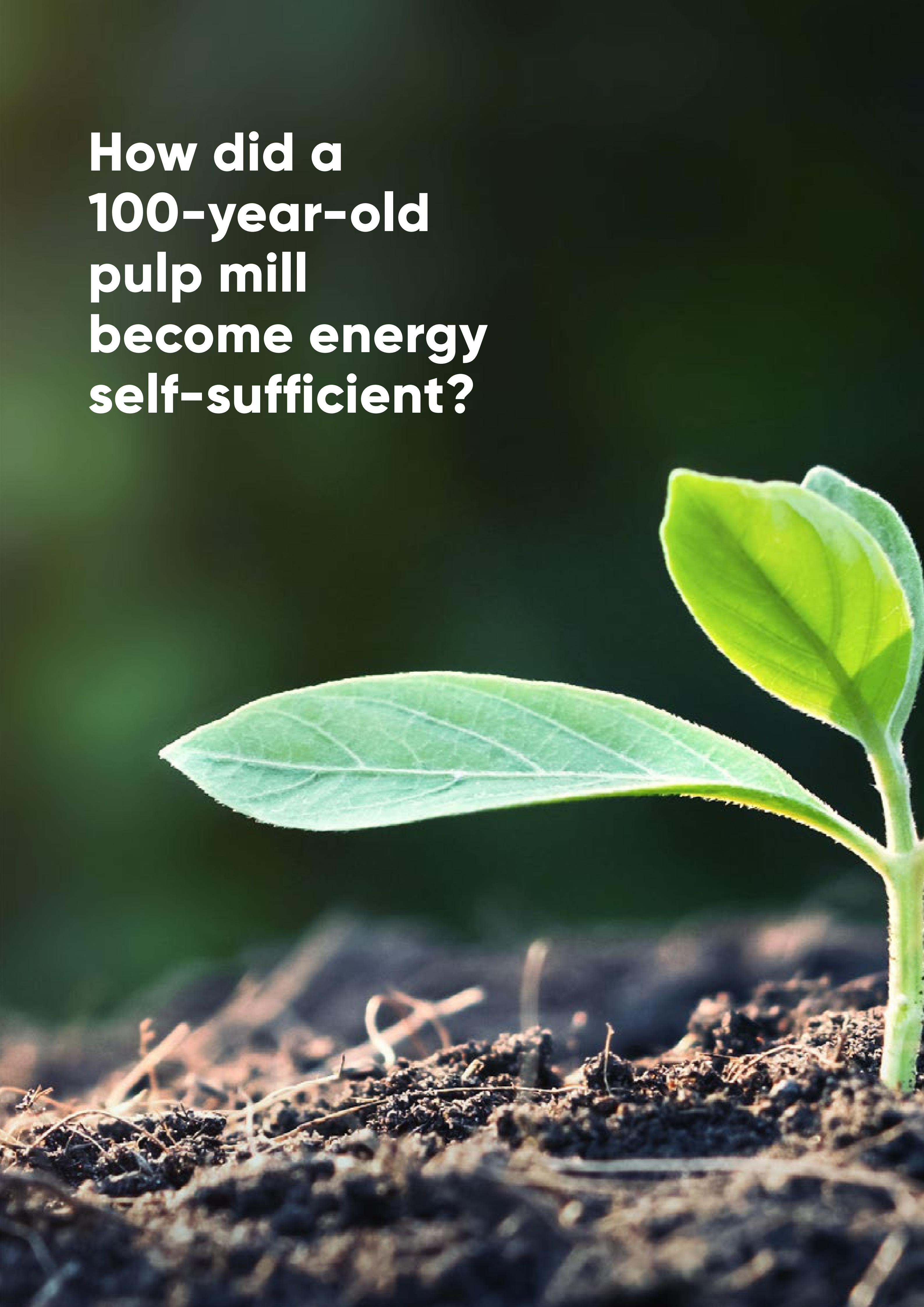
- Uniform low moisture content and substantial increase in calorific value
- Maximum drying air temperature
- No disposal of waste
- Produces substitute fuels and valuable by-products
- Improves profitability by closing the material and energy loops
- Special feeder belt for even feed material distribution
- High thermal efficiency due to air circulation
- Flexibility to handle input material with moisture contents fluctuating between 20 and 50% and different particle sizes
- Combines features of sludge and biomass belt dryers



Typical flow sheet for RDF

ANDRITZ belt dryer for RDF

How did a 100-year-old pulp mill become energy self-sufficient?



Metsä Fibre's Joutseno mill is the world's largest single-line softwood pulp mill. And it's completely carbon neutral. The ANDRITZ biomass gasifier provides a constant flow of renewable biofuel for the lime kiln, replacing natural gas and even producing excess energy – 174% of what it needs to operate.

ANDRITZ delivered the complete 48 MW gasification plant comprising the biomass handling system, an ANDRITZ belt dryer, the feed system and a state-of-the-art circulating fluidized bed (CFB) gasifier for the partial combustion of fuels of differing qualities. The result? Savings of 72,000 tons CO_2 emissions per year and the honor of being the first carbon-neutral facility in Finland during normal operations.

What's more, the investment was quickly recouped by eliminating fuel costs. Are you interested in making your operations more sustainable as well? Ask your separation specialist.

Metris
ANDRITZ Digital Solutions

ANDRITZ offers a broad and constantly growing range of innovative products and services in the industrial digitalization sector under the brand name Metris, helping customers to enhance plant efficiency and profitability, optimize the use of resources, achieve constant and highest product quality, reduce production downtime, and maximize user-friendliness.

Intelligence for machine and process control

With Metris addIQ, you have a well-proven, intelligent control solution for industrial processes and machines. Our solid/liquid separation specialists use their in-depth expertise to provide scalable solutions that are individually tailored to regional and application requirements. Whether you're automating new equipment or upgrading to extend the lifecycle of existing systems, we find the ideal solution for you.

METRIS addIQ CONTROL SYSTEMS

Our tailored turnkey systems from a single supplier can improve entire plants or individual machines. By providing state-of-the-art automation technologies and digitalization, we ensure best-in-class performance. Automating machine and plant equipment measurably reduces gaps in many different production process steps. By using automation from ANDRITZ, you can reduce downtime thanks to features such as predictive analysis that allow you to optimize productivity.

Metris addIQ covers all levels of automation, starting at basic automation (machine, process, and plant control), to upgrades, and add-ons for process optimization. Together, you have a full range of optimized solutions that help reduce maintenance efforts and ensure preventive service for your machines and plants. These are all delivered from a single source and always individually tailored to your business demands. addIQ control systems are part of Metris, the ANDRITZ brand for digital solutions.

Your full-service provider

With ANDRITZ, you gain access to one of the world's largest OEM manufacturers for solid/liquid separation systems, including such well-known brands as 3Sys Technologies, Bird, Delkor Capital Equipment (Pty) Ltd., Escher Wyss dryers, Frautech, Guinard Centrifugation, KHD Humboldt Wedag, Krauss-Maffei centrifuges, dryers, and filters, Lenser, Netzsch Filtration, Rittershaus & Blecher, Royal GMF Gouda, Sprout Bauer, and Vandenbroek.

Whether you need spare parts, rentals, local service, repairs, upgrades, or modernization of your equipment, ANDRITZ is your true full-service provider. From initial consulting through to service agreements, process optimization, and training programs, we are always looking for ways to minimize downtime and increase predictability in operations while raising your overall production efficiency. Wherever you operate, our network of 550 service specialists and global service centers ensures we'll always be there to support you for many life cycles to come. Let's sit down and see how we could take your operations to the next level.

LOCAL SUPPORT
Responsive local service centers and field service technicians

REPAIRS & UPGRADES
Optimization of machine and process performance, repair work, retrofitting, and modernization

SECOND-HAND & RENTALS
Certified second-hand and rental machines

TRAINING
Operator training and tailored seminars for operating and maintenance personnel

OEM SPARE PARTS
Filter cloths, spare and wear parts from OEMs or with OEM level quality, all readily available

SERVICE AGREEMENTS
Preventive maintenance, contracts for spare parts, maintenance, inspections, repairs, upgrades, operation, and equipment monitoring

PROCESS OPTIMIZATION
Automation tools and process expertise to boost your profit

LAB AND ON-SITE TESTS
Lab and testing capabilities for process optimization and machine upgrades

WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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