



BIOSOLID SOLUTIONS

Safer, simpler,
cost-effective sludge drying :



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BELT SLUDGE DRYING TECHNOLOGY

WHAT IS IT :

The Sevar belt dryer is a direct or indirect fired, double pass belt dryer. Hot gas recirculation or single pass configurations can be incorporated to suit the application.

SIMPLE AND ROBUST :

Mechanical and electrical simplicity makes for high reliability and ease of operation, with no need for complex backmixing systems. Typically, a suitable operator is a good all-round fitter with M&E experience, equivalent to NVQ level 3.

LOW TEMPERATURES :

Low temperatures (130-140°C) and long dwell times (50-70 mins) produce consistent granule temperatures, minimising hot spots. Consistent temperatures and retention times ensure pathogen kill to UEPA and European guidelines of Class A and enhanced quality respectively.

LOW DUST :

Dust production is prevented by gentle treatment of the drying material.

PRODUCT QUALITY :

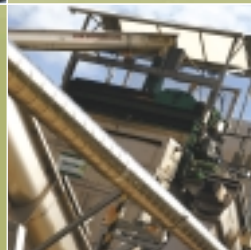
Free-flowing consistent quality product cooled to <30°C to allow safe storage.

ODOUR FREE :

No fugitive emission of odours from the process; cool waste gases can be extracted to a bio-filter after heat recovery.

FLEXIBLE SIZES :

System sizes from <1 to 4 tonne evaporative capacity per hour make the Sevar drying approach highly flexible to a variety of biosolids strategies, from large regional dryer hubs to small district drying plant that can minimise transport impact. Building heights are typically far lower than competing systems, helping to alleviate any planning difficulties.



Sevar's quality engineering and the system's simplicity make for a highly operable and fuel efficient thermal drying solution.

Furthermore, low manpower means that Sevar belt dryers can be used cost-effectively in small district plants, eliminating the significant costs involved in transporting sludge to regional hubs and so making a positive contribution to a better environment.

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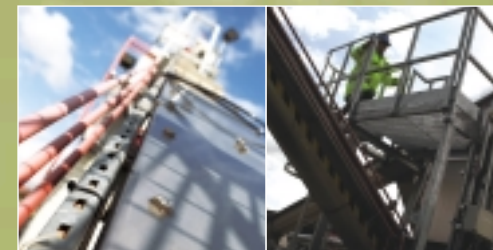
- A safe simple solution that does not rely on Oxygen depletion.
- Gentle product handling ~ no dust production (<2mg/m³ typical dust level far below explosive threshold of 60,000mg/m³).
- Minimal reliance on Safety Instrumented Systems (SIS).

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<p>SAFETY ISSUES : Drying a potentially explosive material raises legitimate safety concerns, which have been comprehensively addressed. Sevar have engineered a simple, low-temperature, dust-free solution to this problem. Through a system that handles the product gently, they have kept dust to a minimum and, through running at a low belt speed, they have reduced mechanical friction and heat potential. What's more, safety does not rely on an oxygen deficient drying atmosphere. With St 1 classification, the product is graded as having 'low explosion severity potential'.</p>	<p>ENVIRONMENTAL CARE : Recycling is widely considered to be the most sustainable method of managing water industry biosolids. But so that people and the environment are not adversely affected, this needs to be done in ways which minimise the nuisance of odour, reduce the risk of pathogen transmission, reduce the need for transportation and its consequential costs and safeguard valuable finite resources, such as phosphate. The thermal drying of this valuable resource meets all these objectives, with Sevar's approach delivering an ideal blend of simplicity, safety and cost-efficiency.</p>	<p>BIOSOLIDS MANAGEMENT : Increasing costs associated with transport, storage and disposal, coupled with odour produced from cake handling, uncertainties over the security of the agricultural recycling route and recent restrictions in access to land associated with foot and mouth all illustrate clearly the need for a secure method of storing biosolids and transporting them to the final point of recycling. Thermal drying neatly fills this niche, producing a dry, odour free and easy to handle, transport and store product, removing the need to transport large quantities of what is essentially water around the country, and associated costs. Drying is a pragmatic, intermediate strategy. Any uncertainties regarding the long term future of the land bank – resulting not from science but public perception – do not detract from sludge drying as a philosophy. Other less sustainable disposal options, such as gasification and incineration with recovery, can still utilise the dried product as a feed material.</p>

Challenging the issues : Successful biosolids management addresses the issues of sustainability, safety and care for the environment. The traditional methods of recycling biosolids resources, if managed with a proper concern for safety, will always exert the smallest ecological footprint.

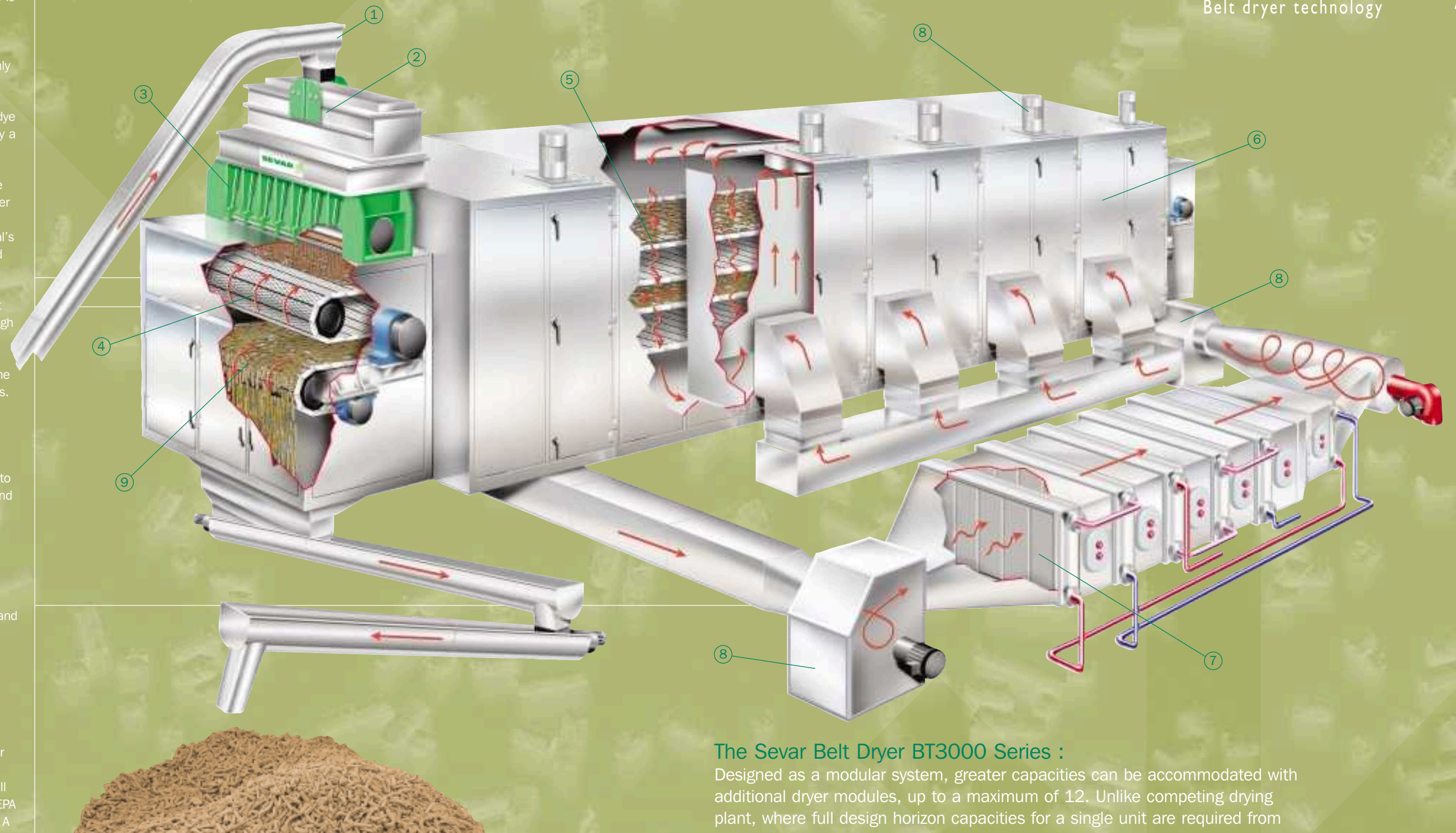
Large sludge drying facilities often involve highly complex plant. Many have blemished safety records as a result of high drying temperatures and dusty conditions combining to create a potentially hazardous operation. By way of contrast, Sevar's approach significantly reduces these risks. By handling the drying material more carefully, at lower temperatures and by employing radically simpler and more reliable plant, Sevar transforms the prospect, turning risk into opportunity.

- Reliable unmanned operation round the clock.
- Thermal drying reduces transport costs and facilitates storage prior to final use.
- Sevar's simplicity and safe operation underpins the concept of thermal drying as a pragmatic intermediate biosolids strategy.



THE BASIC PROCESS :
SIMPLE, RELIABLE, SAFE

- ① Dewatered raw or digested sludge is fed into the distribution hopper continuously.
- ② A rake distributes the sludge evenly across the extruder.
- ③ Cake is then extruded through a dye plate into spaghetti-like strands by a roller press.
- ④ The extruded spaghetti-like sludge drops onto the top belt of the dryer in a uniform layer. The spaghetti consistency increases the material's surface area for efficient heat and mass transfer.
- ⑤ The stainless steel perforated belt transports the sludge slowly through the dryer at a few centimetres per minute. As the material dries, dust generation is prevented by the gentle action of the drying process.
- ⑥ As the sludge passes through successive chambers, the gas temperature gradually increases (130-160°C), heating the sludge to the desired temperature (80°C) and driving the evaporation process.
- ⑦ Heat exchangers typically utilising cooling water or final effluent condense out moisture from the drying air and then pre-heat the drying air prior to the gas burner and other heat sources maximising thermal efficiencies.
- ⑧ Fans keep process air circulating through the system to drive the drying process.
- ⑨ Final dry product is produced after 50 to 70 minutes on the belt. Consistent temperatures and dwell times ensure pathogen kill to USEPA and European guidelines of Class A and enhanced quality responsibilities.



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The Sevar Belt Dryer BT3000 Series :

Designed as a modular system, greater capacities can be accommodated with additional dryer modules, up to a maximum of 12. Unlike competing drying plant, where full design horizon capacities for a single unit are required from the outset, Sevar clients can adjust provision as requirements change.

Models within the BT3000 Series family can range from <1 to 4 tonne evaporative capacity per hour, making it ideal for a variety of biosolids solutions, from large regional hub dryers to small district drying plant.



“If everything at the works operated like the dryer, we’d have no problems. We had recognised the benefits of a belt dryer system and approached three bidders. Sevar was selected as the preferred technology. The system has been simple to operate and has provided good, stable and reliable performance. It is bullet proof! One of my operators commented that if you can operate a digester, you can run a dryer.”

- Aberhard Ludwig, Works Manager, BRS Bioenergie GmbH



↓	CASE STUDY 1	↕	CASE STUDY 2	↓	CASE STUDY 3
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ANGLIAN WATER PLANT WORKS AROUND THE CLOCK; DAY IN, DAY OUT

Following their successful large scale experience of Sevar drying plant at Corby, Anglian Water installed this Sevar BT3000/6 direct fired gas re-circulation sludge dryer at its Colchester works – and it’s been in operation since early 2003.

Digested sludge cake at Colchester is conveyed directly from the dewatering plant to the inlet hopper of the dryer. Here, it is extruded into ‘spaghetti’ and distributed onto the slow moving belt and conveyed through the dryer. Drying gases, heated from the burner, are re-circulated around the belt at between 80 and 160°C. Exhaust gases have their heat recovered and are condensed before being returned to the burner chamber for re-heating.

Waste gases are scrubbed of any odorous compounds and discharged to atmosphere. The dried product is palletised and stored for agricultural recycling. The plant can be started up to reach full capacity in 15 minutes and completely shut down in 20 minutes. It is fully automated, operates 24 hours a day and is manned on a single shift basis.

BIO-ENERGY COMPANY USES PRODUCT AS KILN FIRING FUEL

BRS Bioenergie GmbH is a private company converting municipal sludge and locally derived MSW into a compost material for recycling, while using biogas from the MSW digestion to generate electricity which is exported to the grid.

Based at Villingen Schwenningen, BRS have installed a BT3000/4 direct fired single pass sludge dryer. Sludge cake is delivered to a below ground hopper and transferred by conveyor to the inlet hopper of the dryer. With an evaporative capacity of 650kg/hr, (80,000PE), the unit is fuelled by CHP exhaust gases and supplemented with biogas from the MSW digesters.

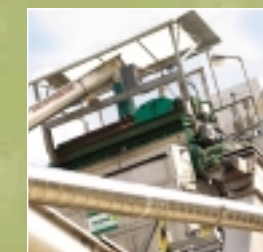
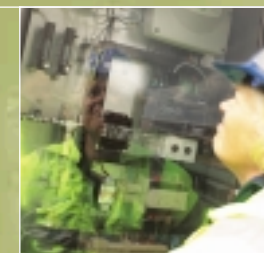
Dryer exhaust gases are cooled and discharged to a biofilter. This simple heating arrangement makes for a highly cost effective drying solution. The product is ground and used as a supplementary fuel for cement kiln firing – the final piece in an environmentally sound jigsaw.

ROBUST SYSTEM IN NON-STOP OPERATION FOR 14 YEARS

Tiefbau GmbH, installed a BT3000/9 direct fired single belt dryer with gas re-circulation at their Mainz plant in 1992. Sludges arise from the main works in Mainz, serving a population of 365,000.

Primary and secondary (BNR) sludges are anaerobically digested and dewatered to 25%DS; then dried product is discharged to skip and removed for co-firing in a power station. This unique belt design offers less flexibility in terms of inlet cake dryness but is exceptionally robust and easy to operate.

Proven technology : With many biosolids applications across Europe – some of which have been operating continuously since 1992 – and a history of drying other materials since 1960 with similar technology, the Sevar belt dryer has a long and successful pedigree. Sevar’s flexibility, with direct or indirect fired, single or double belt and single or recirculation airflow, allows the system to be tailored to each application, while retaining the key tried and tested elements intact.





Flexible solutions : Your organisation's own operational experience should convince you that Sevar dryer technology could play a positive role in handling your biosolids. It is, above all, a flexible technology. Drying times, extruder sizing, operational temperatures and energy requirements can all be adapted to suit the application and a full design service provided to meet the clients needs.

Almost all high – and some low – grade waste heat sources can be utilised to reduce operational energy requirements, from LP steam through CHP/turbine exhaust heat to jacket cooling water. Burners can operate on a variety of fuels, from biogas to diesel.



Mobile dryer : If the sludge type is highly unusual, we can still help, with a mobile dryer unit, with an evaporative capacity of approximately 250 kg per hour mounted on a flatbed trailer. Large scale, on-site trials can be undertaken over a period of a few weeks to determine precise design criteria.

Laboratory services : Unusual sludge types can also be tested for belt drying potential. Working in collaboration with Liege University, we are able to offer laboratory facilities which mimic the operation of belt dryers. Specific water evaporation rates and extrudability can be determined from a representative sample of only a few kilos for any type of sludge.



SAFER, SIMPLER

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