

Higher returns, lower costs: Digestate drying

Two thirds less residual moisture due to compact belt dryers with woven process belts

Renewable energies are becoming increasingly important as substitute for fossil and nuclear energy sources. According to estimates by experts of the International Economic Forum of Renewable Energies (IWR), they provided almost 20 percent of Germany's power requirement in 2011. The German Government is promoting power generation from water, sun, wind and biomass through legal provisions and state subsidies. During the recycling of biomass, digestate dryers make a valuable contribution to increase the returns of biogas plants. As one of Germany's leading manufacturers of dryers for pumpable or spreadable digestates, NEWeco-tec Verfahrenstechnik GmbH has established itself in the market within three years. For the container-based construction of the patent-pending, compact low-temperature belt dryers, the company located in Mühlendorf am Inn relies on process belt technology from GKD – Gebr. Kufferath AG.

Full CHP (combined heat and power) bonus

Biogas is produced from the fermentation of all types of biogenic waste. At the beginning of 2011, there were already 6,500 biogas plants operating in Germany (*source: dena*). The gas produced is converted into power by means of a generator or a combined heat and power unit (CHP). To take advantage of the full feed-in tariff according to the Renewable Energies Act (EEG), the heat generated during power production must also be used appropriately. During the cold winter months, feed-in into the district heating

grid or use as heat energy for residential homes in the immediate vicinity of biogas plants has proven successful. In summer, however, the generated heat is still frequently cooled down by emergency coolers and emitted into the environment without being used. To provide a solution regardless of the season, the generated heat is increasingly used for drying digestates and other biomass. This lowers the costs for transportation, storage and disposal and guarantees the operating companies the full combined heat and power bonus (CHP) of currently three cent per kilowatt hour. The process developed by NEWeco-tec turns liquid digestates into a top-quality, odorless dry fertilizer that can be stored and spread, with a high content of nitrogen, potash and phosphor. However, the flexible application range of the plant also allows economic drying of grain, animal feed, wood chips, as well as industrial or municipal sludge.

Instant success

In 2008, NEWeco-tec Verfahrenstechnik GmbH was founded by Christian Wenner. Prior to this - after completing his studies in mechanical and process engineering at Munich Technical University - he held management positions with various machinery and system manufacturers in the areas of drying, biogas plants and digestate treatment. His business idea of drying digestates in standardized sea containers on belt dryers addressed a real gap in the market. Together with marketing expert and co-partner Martin Bickel, the first two plants were sold straight from the drawing board. An energy manager from the new German States decided in favor of a 40-foot container for drying digestate. Just shortly after start-up of the plant, the neighbors realized its' potential and also had their harvested products, like rapeseed, linseed, grass seed, grains and maize kernels dried for increased storage life. At the same time, the first two-belt dryer started operation in Lower Saxony. Since the success continued, the leased facility

in the start-up center Töging near Munich soon became too small. Hence, it was decided to build a plant in the Upper Bavarian city of Mühldorf am Inn only two years after foundation. In October 2011, the company that has grown to a staff of 35, started operation at its new location, combining development, production and administration under a single roof. Since 2008, Christian Wenner has installed about 100 belt dryer units with more than 525.600 kW heat output per year through NEWeco-tec. In addition to engineering, the complete set-up of each compact dryer, including functional test and customized painting, takes place at the in-house facility. German-based production and turn-key shipping ensure high quality and performance of the plants. Three to five days after delivery, the NEWtainer compact belt dryers are ready for operation. There is an enormous demand: Each week at least one compact belt dryer leaves the factory.

Versatile plant

The concept of the compact belt dryer, marketed by NEWeco-tec under the name NEWtainer, is as convincing as it is efficient: In contrast to conventional dryers, process optimization is based on heating the product as well as allowing free flow through the product, not the space. Prerequisite for this process is a reliable airtight space in which negative pressure is used to draw warm air through the substrate via a suction fan located below the dryer belt. Christian Wenner recognized the required potential in ship containers, same as used for combined heat and power units. Applying the container construction to his concept allowed him to offer cost-effective standardized, space-efficient, portable and expandable plants with certified statics from a standing start. The containers are weatherproof, highly versatile, robust and quickly available. Complete interior wall cladding made of stainless steel ensures permanent corrosion resistance and durability. Since the construction is made entirely of

industrial components, the plants withstand continuous 24/7 operation. Due to their standard dimensions, the containers - even with superstructures - allow regular transport on trucks and modular expansion if necessary.

Construction as needed

The construction of the compact belt dryers is based on a platform principle: Four different models are available. Depending on desired heat absorption and size, the NEWeco-tec compact belt dryers are equipped with one or two belt dryers, fans and heat exchangers. For large-scale plants, a corresponding number of containers with a length of 6 meters are lined up crosswise to achieve the required dryer length. According to the required belt length, the control and exhaust air units are located either inside the container or in an additional container superstructure. Feeders that can be filled directly from the outside or equipped with upstream separators are used to apply the substrate to be dried in an even 100 - 200 mm thick layer on an endless, air-permeable synthetic mesh belt type Conducto[®] 5065. A high-performance heat exchanger positioned above the belt supplies the required process temperature via the heat from a connected biogas plant or an adjacent CHP. Industrial fans positioned below the belt draw the warm air through the substrate layer and the belt by means of negative pressure. In the process, the air is charged with moisture. A radial fan is used to transport the moist air to the outside, while the belt serves as a dust filter for the air conduction from the top downward. Fine particles are retained in the substrate layer. (Depending on the quantity of heat available and process parameters, like ingoing dryness and desired residual moisture, the dryer adjusts belt speed and temperature via a PLC. Matching functional modules, such as separation unit, mixing, conveying, pelleting or briquetting equipment as well as exhaust washer complete the concept. Mixing equipment that blends dried product and raw

digestates allows direct application of digestates starting at 6 percent dry solids. Upstream solid/liquid separators increase the input dry matter content to 20 to 30 percent. Following the drying process in NEWtainer, the products have a residual moisture of 15 percent only, equaling 85 percent dry solids. The efficiency of the plant is impressive: In addition to extremely low power consumption – a 40-foot container consumes only 10 kWh – the savings in volume and weight of the dried product speak for themselves. A biogas plant with an annual output of 500 kW produces 10.000 – 12.000 t of digestates per year. The 40-foot compact belt dryer for a 500 kW plant withdraws two thirds of the water content from digestates and lowers the weight per hour from 600 kg to 190 kg.

Special mesh construction

The endless, patented process belt of type Conducto[®] 5065 made by GKD – Gebr. Kufferath AG plays a decisive role in this high efficiency. Thanks to the special mesh construction, the synthetic mesh dryer belt has a high level of air permeability in spite of small mesh opening. Nevertheless, it reliably retains dust and fine particles. This is of particular importance for biomass substrates like fermentation substrate, sawdust or wood chips, since the efficient retention rate not only prevents interruptions in production due to clogged mesh pores, but also eliminates additional external air purification measures to comply with limit values. Bronze wires woven in running direction prevent electrostatic charging. The robust construction is easy to clean, temperature-resistant up to 120 °C, tensile, abrasion-resistant, with cross-stability and high running accuracy. For years the excellent reputation enjoyed by the process belt in the wood industry, i.e. absolute reliability and wear-free performance even under the most severe conditions, has resulted from these properties. Each dryer in the 40-

foot NEWeco-tec container is equipped with one or two 2.30 m wide and 24 m long belts made of Conducto[®] mesh.

Fruitful cooperation

When selecting the process belt technology, Christian Wenner was influenced, along with his own many years of experience regarding belt dryers, by the consistently positive reputation of the GKD belts. Three years later, in summary of his earlier decision, he states: "Conducto[®] belts are actually as good as their reputation in the industry". He also has very positive memories of the initial consultation by GKD technicians, who provided him with advice and intensive support concerning the optimal mesh configuration for his new compact belt dryer. In view of the fast growth of NEWeco-tec, the reliable as well as flexible delivery of the various belt types became increasingly important to the owner. The robust, consistently high quality of the belts strengthens the high-performance image of his plants. He states that "the cooperation with GKD has been absolutely excellent from the start". Marketing Manager Martin Bickel adds: "We would not like to miss the personal, trustful cooperation with GKD. It is the best basis for continuing growth."

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GKD – Gebr. Kufferath AG

The owner-run technical weaver GKD – Gebr. Kufferath AG is the global market leader for metal and plastic woven solutions. Under the umbrella of GKD – WORLD WIDE WEAVE the company combines four independent business units: SOLID WEAVE (industrial meshes), WEAVE IN MOTION (process belt meshes), CREATIVE WEAVE (architectural meshes) and



WORLD WIDE WEAVE

CompactFiltration (compact filter systems). With its eight plants – including the headquarters in Germany and other facilities in the US, Great Britain, France, South Africa, China, India and Chile – as well as its branches in Spain, Dubai, Qatar and worldwide representatives, GKD is never far from its customers.

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