

## HRS Helps Spanish Grower Become Energy Self-Sufficient

At the beginning of 2012 the Spanish government effectively withdrew subsidies for renewable energy, including biogas production, following a moratorium on support as part of wider economic austerity measures. However, despite this there are still opportunities for businesses to utilise this technology.

HRS Heat Exchangers is helping leading Spanish farming company Kernel Export become more sustainable with its novel Digestate Concentration System (DCS) which is being installed at a new 400 kW anaerobic digestion plant at the company's packing site in Murcia.



Kernel Export's anaerobic digester

With two production sites in Los Alcazares in Murcia, Kernel Export is a leading producer of crops including, salads, brassicas, melons, herbs and courgettes & pumpkins to markets across Europe. Its anaerobic digestion plant uses a natural process to turn by-products and crop waste from some of the 2,000 hectares the company farms into renewable electricity and agricultural fertilizer, known as digestate.

The new AD plant at Los Alcazares already produces enough electricity for 50% of the heat and electricity needed by Kernel Export's packing and storage facilities on the site. As well as significant cost savings on energy, it is estimated that the plant will save more than 2,000 tonnes of CO<sub>2</sub>e each year, equivalent to the energy used by 200 homes.

Although the plant received match-funding from the European Union, as anaerobic digestion in Spain does not receive a Feed-in-Tariff, it is this use of the generated energy which makes the project financial feasible, as is a reduction in fertilizer costs by using the digestate.

The AD plant is fed with crop residues generated at Kernel's packing / growing facilities. The biogas generated in the AD plant will be used in two ways: For electricity production in a CHP engine (during daytime) and for hot water generation in a boiler (during night time). This means that during daytime the evaporator will use the thermal energy from the CHP engine backed up by the boiler. During night time, all thermal energy will be obtained from the boiler only. So an important part of the project is the intelligent integration of two heat sources feeding the evaporation plant. The evaporation plant is setup in a multifunctional way, meaning that fertilizer nutrients can be recovered in the concentrated digestate or in the evaporated water.

Under local rules, unprocessed digestate cannot be applied in Murcia. However, the HRS DCS overcomes this obstacle and is also a key part of utilizing the nutrient rich digestate effectively reducing storage requirements and transport costs for the 50 tonnes of material produced each day. The concentrated digestate will be used as a biofertilizer while the water which is taken off will be cleaned and used to irrigate suitable crops such as salads and vegetables.

Jose Antonio Cánovas Martínez, General Manager of Kernel Export, commented:

*"We had been looking for years for a system to optimize the use of the waste from salads and vegetables from our two production sites and we found the answer in a biogas plant to generate electricity and heat. This is then used to process the liquid and solid fraction after digestion to obtain a bio-compost that we can use in back on our production fields. The project has been a real challenge, as nothing similar has ever been built, with the focus on reusing and recycling salad and vegetable waste to return it back to the land for future production."*

Luis Puchades, Account Manager for Ludan Renewable Energy which constructed the plant added:

*“The three principles behind this project were waste reduction, the generation of electricity and the production of quality organic fertiliser for the farming business.”*

*“We are delighted to have worked with HRS on this project and to continue our good relationship with them. They provided a good and competitive system for concentrating the digestate and they have provided very good levels of support to both us and Kernel Export, including conducting onsite trials to ensure the solution they proposed was the right one. Concentration systems like this are becoming more important when developing anaerobic digestion plants as we need better, profitable solutions for handling digestate.”*



**HRS pilot unit installed at Kernel Export in February 2015**

The DCS uses a multi-effect concentration process using forced recirculation and in this case will provide a two stage concentration system to take the liquid digestate, which has a low dry solid content, and increase the dry matter from between 2.4-4% to 9-15%, meaning that less storage capacity is required and it is fewer operations are required to transport and spread it.

The DCS makes best use of HRS' corrugated tube-in-tube heat transfer technology, using a vacuum to superheat the digestate in a two effect concentrator. This design makes best use of the energy by reusing the low temperature steam produced by the evaporation process.

Arnold Kleijn, Head of Sales and Marketing for HRS commented:

*“We are delighted to have worked closely with both Kernel Export and Ludan Renewable Energy on this project. As well as treating the digestate, the DCS integrates with the existing plant, reusing the thermal energy generated in the process, which might otherwise be wasted, to increase the overall efficiency of the entire process.”*

*“Using quality digestate on their land is an integral part of this project for Kernel Export and this system has been specifically designed to meet their requirements, including reducing the volume of material and maintaining its value as a fertilizer, but in a form suitable for their crops. Since subsidies for renewables, where effectively withdrawn in 2012, a lot of organic waste in Spain has not found a use.”*

*“We are very pleased to be a part of this project as we believe that the solutions chosen by Kernel will serve as an example to the agricultural industry in Spain, demonstrating how crop waste can be converted into energy and high quality fertilizer.”*

**The anaerobic digestion plant is already operating and the DCS will be commissioned in November 2015.**