



ANAERGIA PROJEKT ANAEROBIC DIGESTION FACILITY IN CARDIFF, UK

TOWARDS ZERO WASTE

Wales, situated in the west of Great Britain and bordered by the Irish Sea, is a beautiful green spot. Spacious meadows, hills, moors and mountains characterise the country. Large areas of Wales are protected landscape areas. And since the Welsh people feel closely connected to their country and its nature, it will come as no surprise that Wales was an early adopter of ambitious environmental goals: the country aspires to achieve zero waste by 2050. This means that its recycling rate will have to be increased to 70% by 2025. The fact that Wales is taking its zero waste strategy seriously is demonstrated by the fact that, although the country's current landfill capacity will be exhausted in a few years' time, the country is not allowing any new landfill sites to be created in the future. So there is no time to waste!



AN ANAERGIA PROJECT

DIGESTION FACILITY IN
CARDIFF, UK

RECYCLING FOOD WASTE

An important pillar on the way to greater sustainability and better environmental protection is the use and processing of food waste which is full of energy that can be used sustainably. If food waste is left to decompose on a landfill site, this energy is dissipated into the open air as methane gas that harms the environment. To avoid this, the City of Cardiff decided in 2012 that food waste should be collected from local residents and businesses in the City and in the surrounding county of Vale of Glamorgan to be used to produce biogas, green electricity, and organic fertiliser.

In April 2015, Anaergia was commissioned by Kelda Organic Energy Ltd, a subsidiary of the Kelda Group, to build a biogas plant with waste processing facilities on the site of Welsh Water's Cardiff Wastewater Treatment Works in Tremorfa (Cardiff, Wales).

The plant now owned by Welsh Water Organic Energy can process up to 35,000 tons of food waste every year: kerbside food waste with <7% non-organic contamination and commercial food waste with <10% non-organic contamination. The food waste is prepared by removing all non-food contamination before it is processed in two fermentation tanks to produce biogas. The biogas is used to operate a combined heat and power (CHP) which produces 2 MW_{ele} and 2 MW_{th} supplying clean electricity and heat to the plant and excess electri-



city to the neighbouring wastewater treatment works or the public grid. The heat is used to heat the digesters and pasteurise the digestate on site. In addition, the process produces 1,886 tons of solid digestate for compost production (20-25% dry matter) and 37,611 tons of liquid digestate for crop production (3-4% of dry matter) a year. These are impressive figures, showing what state-of-the-art waste processing technology is capable of.

POWERFUL TECHNOLOGIES

Optimised pre-treatment of the food waste used is decisive for the efficiency of the overall facility and for the quality of the biogas and solid and liquid fertilisers produced. To achieve this, Anaergia combines two highly powerful systems at its Cardiff facilities. The first step consists of using a db-Bag Opener from our Dutch subsidiary db to tear open the waste bags delivered to the plant and then prepare the waste for further processing.

Next, an Anaergia BioREX 300 high-pressure extrusion press reliably separates the waste into organic and inorganic components. Water is added to this to create a pumpable fermentation substrate that has been optimised for the fermentation process and that contains less than 3% inorganic substances. The share of organic substances in the separated inorganic fraction is less than 5%.

Anaergia has implemented leading biogas technology from its German subsidiary UTS in the fermenters. This ensures a maximum biogas yield with minimum energy consumption. PSM submersible mixers with intelligent motor control (DMC), a high torque (up to 800 Nm), and carefully developed mixer blade geometry ensure the best possible flows with gentle metabolism/gas exchange for the bacteria and uniform through and through mixing of the entire fermenter contents. The mixing process is optimised and the hydraulic retention time (HRT) is extended. UTS service boxes enable service and maintenance of the mixing technology without opening the roof and thus without any methane escaping. The biogas produced is treated using biological desulphurisation and is then dried before being used in the CHP to produce clean electricity and heat. The digestion process ends with pasteurisation and a high-end UTS filter screw press (FSP) separating the fermentation residues or digestate into solid and liquid fractions. The liquid fraction meets the stringent British Standards Institution (BSI) Publicly Available Specifications (PAS) 110 standard which allows for less regulated use of the organic fertiliser.

MANY ADVANTAGES

The facility in Cardiff is an excellent example of how modern waste management can work intelligent-

ly. There is less burden on landfills and the environment and climate are protected. The environmental balance and benefits for the City of Cardiff and the surrounding area are enormous. Less methane is released whilst at the same time generating biogas for the production of clean electricity. In addition, valuable fertiliser is produced for agriculture, reducing the need for the energy-intensive production of artificial fertiliser. These are two factors that significantly reduce CO₂ emissions. All in all, this facility is an important step towards achieving the ambitious sustainability goals that Cardiff and Wales have set.

Councillor Bob Derbyshire, City of Cardiff council cabinet member for environment: "The signing of the contract with Kelda signifies a new 15-year partnership between Kelda, the City of Cardiff council, and the Vale of Glamorgan council to deliver innovative ways to treat organic waste. This contract is a reinforcement of our commitment to meet the statutory Welsh Government targets as we work towards their 'Zero Waste' goal for 2050." As part of this partnership, Anaergia designed and built the plant in Cardiff using its know-how and leading technologies. We are very pleased that our work has contributed to greater sustainability and has brought Wales closer to achieving its Zero Waste goal. Sometimes zero is the best you can achieve. ■