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Recycling of biowaste and green waste in Coesfeld

Municipalities and companies go for the Energy Turnaround

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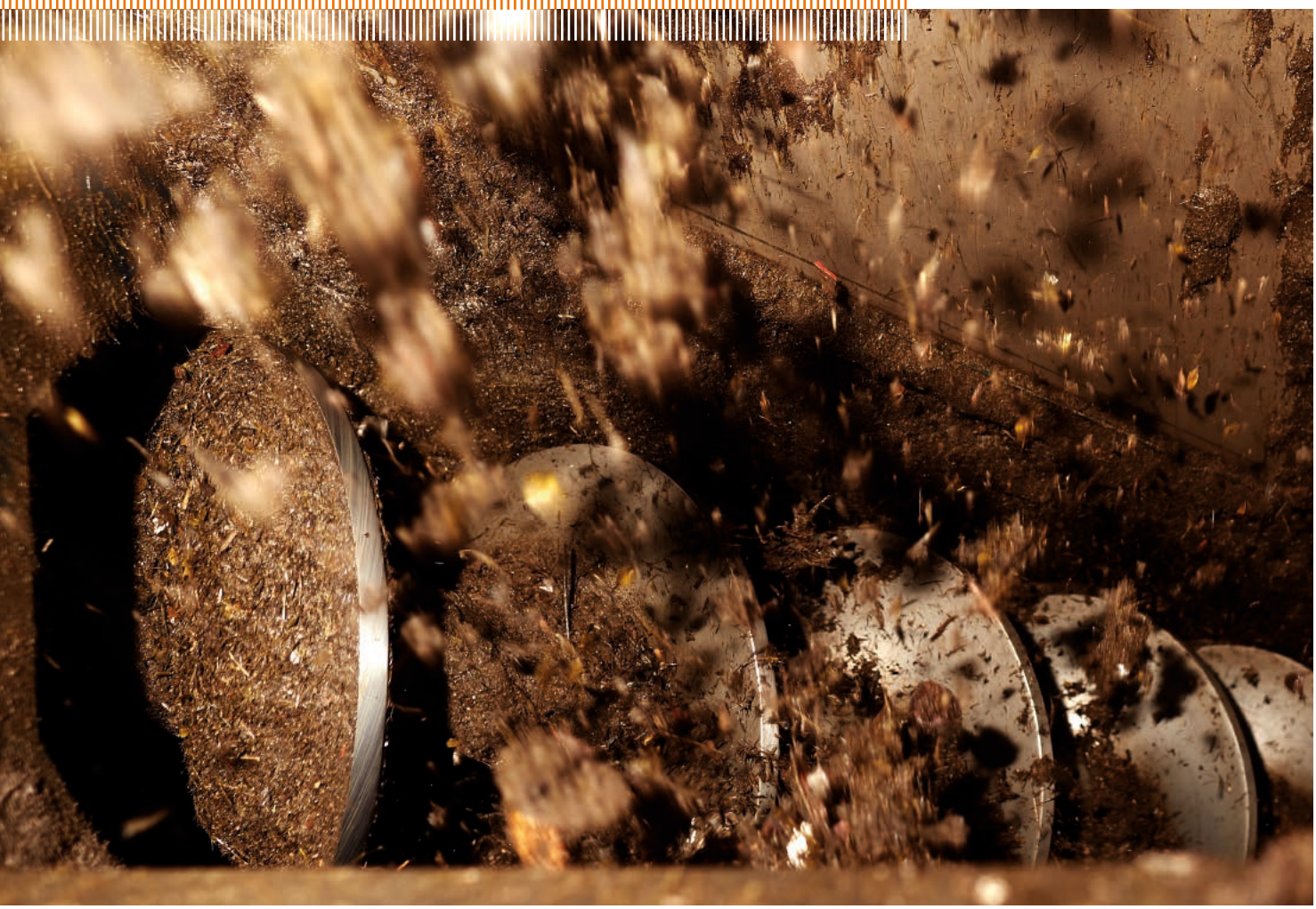

The background

The district of Coesfeld has always been proud of its environmental awareness. For 25 years biowaste and green waste have been collected separately in this small district in the western Münsterland region with its 215,000 inhabitants. The large brown bio bin is now a permanent fixture of the waste management system and the general public couldn‘t imagine life without it. Every resident uses it to dispose on average of about 170 kilograms of biowaste and 28 kilograms of green waste per year, yielding a total of about 45,000 tonnes of collected biowaste and green waste. The recycling potential of this quantity is now fully exploited as a material and a source of heat in the district of Coesfeld.

The situation

To date the biological waste has merely been composted in Coesfeld-Höven, but now a biogas plant belonging to the company RETERRA West GmbH & Co. KG has been installed upstream of the composting. Here biogas is recovered by dry fermentation (dry matter content >25 %). The process is known as plug flow fermentation because the substrate fed in, in this case the biowaste and green waste, is passed through the fermenter in the typical form of a plug. An agitator is used to manage the flow and to discharge the biogas formed out of the fermented material. The fermentation residue is finally composted and used as organic fertilizer. This ensures a cascading use of the waste. The investment by the company RETERRA in the Coesfeld-Höven site amounts to about 12 million euros.

Technical details

The gas produced (up to 600 m^3/h) is conveyed through a pipe which is approximately 800 metres long into the biogas treatment plant belonging to GFC (Gesellschaft des Kreises Coesfeld zur Förderung regenerativer Energien mbH). The biogas initially still contains 50–65 vol. % methane and 35–50 vol. % carbon dioxide, plus traces of

hydrogen sulphide, water vapour, ammonia, nitrogen and oxygen – but only the methane can suitably be fed into the natural gas network subsequently. In the treatment plant, in which GFC has invested about 2.8 million euros, the biogas is purified to a quality which is indistinguishable from that of fossil natural gas in terms of energy content and combustion properties. The methane content is enriched to volume percentages of as much as 98 vol. %. Once it has been fed into the natural gas network, the biomethane is a perfect substitute for fossil natural gas. This is a major contribution to climate protection (savings of 5,000 tonnes CO_2 per year).

Prepared for all contingencies

To ensure that the treatment proceeds as smoothly as possible, GFC has also arranged for the erection of a biogas storage facility with a capacity of 7,000 m^3. This guarantees even charging of the biogas treatment plant despite natural fluctuations in gas production. In addition the incoming gas can be stored where maintenance work is being performed. There are also two unit-type CHP plants available to covert the biogas into electricity if the biogas treatment plant is not available for some reason. To provide the necessary safety there is a special emergency flare which can burn the gas off safely if there is an unforeseen malfunction.

Conclusion

The district of Coesfeld takes its role as an exemplary municipality very seriously and is making a valuable contribution to climate protection. At the same time it plays a pioneering role in gas treatment and the infeed into the natural gas network of biomethane generated from bio and green waste. The example of Coesfeld can also serve as a model for co-operation between local authorities and private companies. Private and municipal investments lower prices, boost the status of renewable energy sources and drive the Energiewende (energy turnaround) forward. It is already possible to supply 1,400 standard households with the biogas energy generated of an annual 23,000,000 kilowatt hours.

But they‘re still not satisfied in the district of Coesfeld: the next step will be certification of the biogas as vehicle fuel. Road traffic will then also be able to profit from this CO_2-neutral energy source.

Brief profile of the Coesfeld-Höven biogas treatment plant

- **Location:**
  Coesfeld-Höven landfill for household waste, Rosendahl municipal district
- **Construction period:**
  August 2012 – November 2013
- **Performing companies:**
  – the company Schwelm, Schwelm: plant engineering, storage facility
  – the company Lüllmann, Münster: civil engineering and piping construction
- **Investment:**
  2,800,000 euros
- **Owner/Operator:**
  Gesellschaft des Kreises Coesfeld zur Förderung regenerativer Energien mbH (GFC)
- **Input material:**
  approx. 45,000 tonnes of bio and green waste from the district of Coesfeld
- **Quantity of raw gas:**
  600 m^3 N/h
- **Max. infeed quantity:**
  350 m^3 N/h biomethane (biogas)
- **Gas storage:**
  7,000 m^3
- **Biogas energy yield:**
  17,000,000–23,000,000 kWh
- **CO_2 saved:**
  approx. 5,000 tonnes per year

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