Case study

Industrial waste heat recovery – climate-friendly district heating supply for the town of Mayen

Some people have too much energy, others do not have enough. This calls for the services of an intermediary that can reconcile these particular interests. STEAG New Energies specialises in decentralised power generation and project partnerships with municipalities. These include the award-winning ‘district heating supply in Mayen’ project, providing district heating for the town exclusively using waste heat from a nearby paper factory.

Up until the end of the 1990s, public and private buildings in Mayen, Rhineland-Palatinate were heated by decentralised systems based on conventional fuels such as fuel oil or gas. Not far from the town itself stands WEIG Karton’s large paper factory, whose production processes release large amounts of waste heat into the air. To enable this waste heat to be put to good use as a heating supply, Moritz J. Weig GmbH & Co. KG and the public utility company Stadtwerke Mayen joined forces with what is now STEAG New Energies as a specialist in district heating.

The challenge:
Ensuring a district heating supply whilst also reducing CO_2 emissions

The aim was to provide the town with a district heating supply based entirely on waste heat from the paper factory. This concept is an example to the rest of Rhineland-Palatinate, as what was previously waste energy is now being put to meaningful use on a large scale. It has significantly lowered harmful carbon dioxide emissions in Mayen and improved air quality in the region. CO_2 emissions have been reduced by around 5,400 tons a year.

The plan in Mayen was to replace single combustion systems that were generally run on gas or fuel oil. The aim of this was to increase quality of life in the Eifel town by improving exhaust air and reducing smoke and soot pollution. ‘STEAG New Energies was also looking for an innovative project’, Andreas Jochem explains. However, as the decentralised plant coordinator for central Germany and technical director of the Mayen district heating supply understands: ‘The overall combination must be right if a project is to succeed.’

This includes the municipality itself showing a desire to change. In addition, there needs to be a company prepared to make its waste heat available. It involves more than just establishing points of connection, ‘it means getting involved in production’, Jochem notes. Finally, a partner is required with technical expertise in district heat supply installations.

Projects like these work particularly well near to companies from energy-intensive sectors such as glass production or those using furnaces.

The paper and cardboard factory also proved to be very suitable, ‘even though it was already operating in a very energy-efficient way’, Jochem adds. In return, WEIG Karton’s energy footprint is boosted by the use of their waste heat that was previously going unused.

The solution:

A district heating supply is usually incorporated when designing new residential areas or large administrative buildings. ‘In Mayen, implementation was more complex. Nevertheless, we managed to build the main network in just a year. It is then particularly important to consistently improve the use existing pipelines’, technical director Jochem emphasises. A high supply density ensures the profitability of the project, which involved a high level of investment in Eifel.

Mayen uses 20,000 megawatt hours of heating per year. Heat exchangers were installed at WEIG Karton for this purpose. ‘They had to be virtually tailor made for this specific situation’, Jochem highlights. Surplus heat is removed from exhaust air and gas and transferred into the heat distribution network. District heating storage was also installed to enable heat from production peaks at the cardboard factory to be absorbed and then released on a delayed basis as required – since supply and demand rarely coincide. ‘Homes need the energy in the mornings and evenings, but the factory produces it all day long‘, Jochem explains. ‘The storage system has enabled us to compensate and balance out requirements within the network’. The storage holds a total volume of 300 cubic metres. ‘ That is enough to cover a peak of three to four hours.’

In September 2014, the ‘district heating supply in Mayen’ project operated by STEAG New Energies and the town of Mayen was awarded the Tandem Prize for exemplary cooperation projects with companies at the state of Rhineland-Palatinate’s ‘Municipalities with a Friendly Environment for Medium-Sized Companies 2014’ competition.

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