# Compressed air and heat system for the industrial park Düren

**Reference Report Bosch Industrial**

## Reliable and ecological compressed air for chemical processes

### The company

“Resources for the world”, this is the slogan of the Veolia Group. With nearly 174,000 employees on all five continents, the Group designs and provides water, waste and energy management solutions that contribute to the sustainable development of communities and industries. In Germany, Veolia and its affiliates have around 12,400 employees at around 300 locations. Among others in the industrial parks in Heinsberg and Düren-Niederau, both in North Rhine-Westphalia, Germany. Veolia supplies various industrial customers at the two sites – for example, with process heat, electricity, water, refrigeration or compressed air and provides technical services for the industry, such as maintenance and repairs. Although both industrial parks are already working efficiently, Dr. Stefan Langer, managing director responsible for energy and water management, sees more future opportunities to further cut the use of resources and reduce the ecological footprint: “We will exploit all opportunities to operate the industrial parks efficiently for the benefit of our customers and for that also invest in innovation regularly.”

### The Düren site

The grounds of the industrial park is located in Düren-Niederau, south of the city of Düren. A total area of 120,000 m² results of an extension of about 460 m in the east-west direction and about 400 m in the north-south direction. Park owner is the company Akzo Nobel Chemicals GmbH, but without operating its own production facilities at the site. The company Veolia Industriepark Deutschland GmbH has taken over the management of the central facilities and networks for supply and disposal. Veolia supplies the resident chemical companies with natural gas, operating and drinking water, steam, electricity and compressed air. At the site, various materials such as water glass, precipitated silica, aluminium silicates, surfactants, products for the paper industry and additive mixtures for the plastics industry are produced.

## The project

Shortly after the takeover, Veolia began modernising and developing the site in terms of efficiency and sustainability. Due to the high energy consumption of the chemical companies, the optimisation was particularly rewarding. The goal was to generate steam increasingly through combined heat and power generation and, thus, to further optimise the own power supply – no problem with the modernisation of the energy centre. A steam boiler shut down in 2015 was dismantled and thus created around 250 m² useable floor space. In its place are now efficient, innovative plants. Thus, the operational steam demand is provided by renewed steam generators and newly installed micro gas turbines in combination with a waste heat boiler.

## Efficient use of compressed air and heat

Another innovation at Veolia's energy centre is the implementation of two Bosch CHA CA 570 NA compressed air and heat systems (CHA), which replace an outdated conventional air compressor. The simple replacement would have brought no improvement in terms of efficiency and the environment, while now the compact CHA modules reduce the ecological footprint tremendously. With a compressed air supply of 9.5 m³/min each, the two CHA cover a large part of the base load requirement of the industrial park, using natural gas instead of more expensive electricity. The high base load requirement within the park allows each CHA to run at full load for around 8,400 operating hours per year. Three conventional compressed air generators cover the additional base load requirement and the required peak loads. Together with the compressed air of the other compressors, the compressed air from both CHA is processed centrally and distributed to the consumers. In the case of lower compressed air demand, continuous regulation of each CHA down to 60 % of the engine power is possible.

*Both CHA run around 8,400 operation hours per year.*

Process-related heat is formed during the generation of compressed air, which is used efficiently by the CHA. The heat from the compressed air generation as well as from the engine and exhaust gas is decoupled in the process at the CHA and is 135 kW per module. In the Düren industrial park, this total heat output of 270 kW is transferred via heat exchangers to the boiler feed water. This leads to a correspondingly lower gas consumption, since the additionally required heating of the boiler feed water is reduced. Through this efficient use of waste heat, the CHA reduce the total heat demand of the energy centre.

Both CHA modules are equipped with a noise-protection cabin and fresh air intake for minimum machine noise and the exhaust air is channelled through the roof. Thus, the systems cause no significant additional noise and temperature loads in the energy centre.

*Each of the compressed air and heat systems produces approximately 9.5 m³/min compressed air and 135 kW heat.*

## Precise control. Monitored at all times.

In the course of correct consumption billing and a sustainable energy management system, an accurate measurement of compressed air flows and charges is absolutely critical for passing it on to consumers. Therefore, the energy efficiency software EnEffCo® of the company Ökotec – a company of Veolia – was implemented, which serves as a controlling tool and precisely monitors the energy and resource flows of the plant. The measurement data are assigned to the individual plants and producers and allow a comprehensive reporting.

An extremely high number of operating hours of the CHA leaves little room for unplanned downtime. In order to prevent this case, the operator can monitor the operating data of the CHA by the remote access MEC Remote at any time. The responsible energy manager can access the data from any Internet-enabled terminal and can even adjust some settings from afar – of course at the highest level of security through VPN encryption. The Premium Service also allows Bosch KWK service experts access to the CHA data of the system and actively informs the operator in the event of a fault. If an on-site appointment is necessary, the service technician can often make an assessment in advance and bring the corresponding parts directly.

## Conclusion

The chemical processes within the customer facilities require emergency generators for selected areas for the security of supply. In the event of a power outage, the Bosch CHA now relieve the existing emergency power system enormously, since the required compressed air can be supplied by means of natural gas. After only a few seconds, the CHA are running nearly at full power again, ensuring that no production stops occur due to lack of compressed air. Volker Duven, Head of Industrial Plant Management at Veolia Industriepark Deutschland GmbH, is satisfied: “The decision to install the recently implemented Bosch compressed air and heat systems was ultimately the right one. The approval, installation and commissioning went absolutely smoothly. After only two commissioning days each, the regular operation could be started safely. The acceptance measurements were all in the assured areas. Availability is very high so far and is only interrupted by regular maintenance.”

## Compressed air from natural gas

The Bosch compressed air and heat system looks like a classic CHP module but it generates compressed air and heat instead. Like in a combined heat and power system, a combustion engine – here with a mechanical shaft power of 60 kW – forms the heart of the compact module. Instead of using a generator to produce electricity, however, a compressor is powered using the entire drive power of the engine. To adapt to the varying need for compressed air, the speed of the gas-powered engine is controlled and can be set to any value from 60 % power upwards.

At a fuel power of 164 kW, the amount of compressed air generated is 9.5 $m^3$/minute at a maximum operating overpressure of 8.5 bar and the usable heat output is 135 kW – equalling a thermal efficiency of 82 %. To achieve this heat output, the heat of the CHA is decoupled to three different components by means of heat exchangers. Heat is released first at the engine, which is designed to generate a large part of the heat, with a heat output of 48 kW. The screw-type compressor also releases large amounts of heat with 48 kW heat recovery. A classic plate-type heat exchanger in the CHA's waste gas duct recovers an additional 39 kW.

## The companies involved

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