

Case story | VACON® NXP Air Cooled

From waste to sustainable energy: electricity and heating for the city

Casagrande Elettrocostruzioni SpA relied on the quality and reliability of the VACON® NXP drives for the construction of the efficient Energy from Waste plant (EFW), built by Hitachi Zosen Inova on behalf of the City of Edinburgh and Midlothian Councils under a public-private partnership arrangement with FCC E&M Ltd, a subsidiary of FCC Environment (UK) Ltd.

SCOTLAND: In the suburbs of Edinburgh, an innovative system for the treatment of non-recyclable urban waste helps to reduce the city's environmental footprint. In line with the zero waste objectives of the Scottish government, it contributes

to eliminating landfill whilst generating electrical energy and heat. The waste combustion process generates heat enough to supply 25,000 households.

Best practice in design and construction ensures optimal energy efficiency of the waste treatment process, where electrical and electromechanical plants are equipped with high-efficiency VACON® NXP drives.

155,000**tons per year****of non-recyclable
municipal solid
waste sent for
energy recovery**

Competence that improves **energy efficiency**

The Millerhill Zero Waste Parc plant is an energy-for-waste (EfW) facility designed and built by Hitachi Zosen Inova (HZI) on behalf of FCC Environment, the company responsible for managing environmental services in the municipality of Edinburgh.

The EfW facility has a capacity of 155,000 tons per year of non-recyclable municipal solid waste, which after separation of metal residues, is sent for energy recovery.

The sophisticated XeroSorp gas treatment process patented by HZI makes it possible to optimize plant performance and reduce the emission of residual particles into the atmosphere to a minimum.

The electrical and electromechanical systems supporting the waste treatment process ensure high energy efficiency of the 20 MW plant, and guarantee the reliability and durability which are essential for this kind of project, planned to operate continuously for decades.

Casagrande Elettrocostruzioni Spa was responsible for the design, construction and commissioning of all the electrical panels that supply the many and varied electrical utilities installed in the Edinburgh plant.

*Sergio Boccagni,
Project Manager at Casagrande Elettrocostruzioni:*

“Together with Hitachi Zosen Inova, we defined a methodology for the design and construction of electrical switchboards, integrated into E-house containers at the factory. We met the demanding schedule imposed by the client, and also synchronized perfectly with site development needs, minimizing the time required for installation, commissioning and start up of electrical systems. Casagrande Elettrocostruzione assumed full technical and operational responsibility for the construction of electrical panels. Its approach allowed the customer to successfully start the plant on schedule and ensured excellent energy efficient performance as defined in the project.”

Containers completed and tested by Casagrande Elettrocostruzioni ready for shipment to the Millerhill Zero Waste Parc (Prevention and Recycling Center) in Edinburgh



Non-stop drives

The electrical panels which supply power to the combustion process are integrated into seven containers known as E-houses. Sized 15 m x 3 m x 3.5 m, they are placed inside a metallic bearing structure inserted in a thermally insulated building located adjacent to the process plants.

The seven containers contain the entire electrical infrastructure necessary for the EFW facility, from the medium-voltage connection to the distribution of all medium and low-voltage users.

The most powerful control system is linked to the emission treatment subsystem of the incinerator, Heavy loads in this system absorb about one-third of the installed electrical power.

The following drives regulate fans, pumps and motors rated up to 450 kW:

- 1 off VACON® NXP Air Cooled, power supply 450 kW AFE
- 3 off VACON® 100 FLOW, power supply 200 kW
- 1 off VACON® 100 FLOW, power supply 160 kW
- 2 off VACON® 100 FLOW, power supply 90 kW
- other smaller VACON® drives



Inside view of a container made by Casagrande Elettrocostruzioni for the Edinburgh Energy from Waste plant

Mr. Boccagni:

"We chose Danfoss VACON® NXP drives because they allow us to achieve maximum performance in demanding applications. High energy efficiency must always be combined with exceptional reliability. From this point of view the Danfoss VACON® product range is a guarantee."

Good people make the difference

Casagrande Elettrocostruzioni collaborated with Danfoss Drives Italy to customize the high-power drives to meet the specific needs of the customer. For example, special panels for high-power drives were designed with a circuit breaker instead of a service switch with fuse, and using halogen-free cables instead of PVC cables. Mechanical details were adapted to ensure optimal installation of equipment in the container.

Furthermore, the command and control parameters to be sent to supervisory systems were chosen and optimized for simple and effective integration with the SCADA plant. Many activities required specialized skills, where the ability and willingness of people made the difference.



Electrical panel for the waste plant in Edinburgh during the final testing at the Casagrande Elettrocostruzioni factory in Verona



Detail of the electrical panel made by Casagrande Elettrocostruzioni housing Danfoss Drives VACON® NXP



Sergio Boccagni, Project Manager (left) and Stefano Casagrande, Owner (right): "In Danfoss Drives Italy we found the optimal partner"

Mr. Boccagni explains, "In this project, product quality was prerequisite for selecting the most suitable supplier. Therefore, our criterion of choice was basically to rely on a company that knew how to support us from the technical point of view and with flexibility. Our need was to work in synergy to make a "tailor made" solution that would meet customer demand. We found the optimal partner in Danfoss Drives Italy.

"The main feature of Casagrande Elettrocostruzioni, which makes the difference compared to other companies, is the capability of our factories in Verona and Campobasso to fully realize the entire electrical panels, from the construction of the carpentry

to the choice and customisation of electromechanical and electronic components. This capability extends to integration inside containers (as in this project) and final testing as a complete system. We have developed great engineering skills that allow us to help the customer to choose the best solutions for each order, starting from the type of circuit to the choice of active and passive components. We adopt the same kind of collaborative approach with our suppliers, of which Danfoss is an exemplary case. It is not enough for us to have efficient and reliable products. We also need expertise and engineering. All these elements are available for the benefit of our customers, as they were during the Edinburgh EfW plant project"

Casagrande Elettrocostruzioni

This dynamic and modern Italian company offers more than sixty years of experience in the electromechanical sector. It designs, builds and installs switchboards and switchgears, equipment and systems for the control, production and distribution of electrical energy. This equipment typically serves low, medium and high voltage applications in high-power industrial plants, such as steel plants, paper mills and power plants.

<http://www.casagrande.vr.it/en/index.html>