

Case study | VACON® NXP Air Cooled, VACON® 100 FLOW

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

Casagrande Elettrocostruzioni SpA relied on the quality and reliability of the Danfoss Drives 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.

In the suburbs of Edinburgh an innovative system for the treatment of non-recyclable urban waste has been developed which helped to reduce the environmental footprint of the Scottish capital by the elimination of landfill in line with the Zero Waste objectives of the Scottish Government, and the generation of energy and heat.

In fact, the combustion process allows obtaining both, electrical energy from the burning of waste and of heat, which will be used to heat around 25,000 households.

During design and construction of the plant, all the best practices have been used to maximize the overall energy

efficiency, starting from the electrical and electromechanical plants supporting the waste treatment process, where high-efficiency VACON® NXP drives were installed.

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 was 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 maximize the energy performance of the plant, while on the other hand, it effectively reduces 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 of this project for Casagrande Elettrocostruzioni:*

“Together with Hitachi Zosen Inova we defined a methodology for the design and construction of electrical switchboards, integrated into containers pre-finished in factory, called E-House, which respect the demanding schedules imposed by the client, and, on the other synchronise perfectly with the site development needs, minimizing the time required for installation, commissioning and start up of electrical systems. The approach proposed by Casagrande Elettrocostruzioni, who has the assumption of full technical and operational responsibility for the construction of electrical panels, was successful and allowed the customer to successfully start the plant on schedule and guarantee the excellent performance of energy efficiency 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 all the loads of the combustion process installed in Edinburgh, are integrated into seven containers, called E-Houses, sized from 15 m x 3 m x 3.5 m, placed inside a metallic bearing structure inserted in a thermally insulated building build 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.

Particularly relevant is the system for command/control the heaviest loads,

mainly linked to the emission treatment subsystem of the incinerator, which absorb about one third of the installed electrical power.

For the piloting of fans, pumps and motors, one of which with a maximum power of 450 kW, the following drives have been used:

- 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

Especially for high power drives, the project required the implementation of customized solutions.

The technical department of Casagrande Elettrocostruzioni collaborated with the same Danfoss Drives Italy department to define together all the customizations necessary to meet the specific needs of the customer.

For example, special panels for high power drives have been designed with a circuit breaker instead of a service switch with fuse, using halogen-free cables instead of PVC cables. Several mechanical details have been reviewed to ensure the optimised installation of the various equipment into the container.

Furthermore, the command and control parameters to be sent to supervisory systems have been 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 says: "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. In Danfoss Drives Italy we found the optimal partner.

"The main feature of Casagrande Elettrocostruzioni, which makes the difference compared to other companies", specifies Mr. Boccagni, "is the capability to fully realise in our factories in Verona and Campobasso, the entire electrical panels, from the construction of the carpentry to the choice and customisation of

electromechanical and electronic components, with the possibility of integration inside containers (as in this project), until its final testing as a complete system. We have gained great engineering skills that allow us to help the customer from time to time 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, what we need is also expertise and engineering. All these elements are at disposal to our customers, as done for 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>