Clean heat for Santa Caterina.

There are plenty of winter sports enthusiasts who count Santa Caterina as their favourite resort. Santa Caterina has also hosted more than its share of exciting world-cup skiing. Cold temperatures may be welcomed out on the piste, but whether you're a casual weekend skier or a top international athlete, you'll still want to be snug and warm once you're back indoors: This represents a challenging task for TCVVV AG and its district heating plant in Santa Caterina Valfurva.

The company TCVVV AG was founded in 1997 to produce and distribute clean energy from biomass, and use it for heating and electricity generation. This company builds production facilities, and designs and constructs district heating plants and electricity stations. Managing director Walter Righini: "Our primary objective is to use and add value to local resources; by using renewable energy sources we aim to reduce our dependence on energy from external sources. The municipality of Santa Caterina Valfurva is not connected to the methane gas network, but it does have access to renewable energy sources, in particular wood. This is the main pre-requisite for building a district heating plant fuelled with biomass."

The district heating plant uses mainly waste products from wood processing, tree surgery and afforestation. Weekly deliveries from local sawmills and other local suppliers guarantee the plant's supply of renewable energy sources. To protect the environment, the waste gases produced in the combustion process are constantly monitored. The amount of CO_2 produced when the plant is in operation is exactly the same as the amount of CO_2 absorbed by the trees during their life cycle; this is why the district heating plant can justifiably claim to operate on a CO_2-neutral basis.

For control and data acquisition in its district heating plant, TCVVV AG was keen to go specifically with PC-based

technology and an Ethernet network. For safety reasons, redundancy was to be built into the PC network. In the words of the engineer Fabio Pola, who held overall responsibility for all the hardware and software: "We were particularly keen to avoid as far as possible working with conventional PLCs, because redundant hard PLCs are difficult to find and also costly. We were looking for modern, open technology that would allow us to work in a flexible way whilst at the same time reducing our costs."

DESIGNING A CLEAN ENERGY SUPPLY

COPA-DATA proposed a redundant, integrated solution to TCVVV AG to safely supply the district with heating. The district heating plant in Santa Caterina features a zenon control system that gives the operator central access to all the parameters for the burners. The IEC 61131 compliant straton is already integrated into zenon. This is a soft PLC which is also embedded in a hardware PLC, and it created the link with the controllers. Redundancy can easily be incorporated in both these systems.

The zenon operating system and straton work extremely well together, and this brings the project a number of benefits, especially in terms of speed, data security and cost reductions. zenon and straton run on the same server. They are so closely linked that they even use the same database, which makes configuration considerably simpler, quicker and safer. Variables therefore only need to be created and maintained once.

The server for the TCVVV project is also designed with built-in redundancy, and it will continue to work perfectly even if a module in a computer should malfunction.

Both systems – server and stand-by – are always supplied with the latest data. They also both communicate with the controllers; in other words all the data sent by a PLC arrives simultaneously on both computers. If the control computer fails, then the stand-by machine will take over immediately. As soon as the first server is operational again it will automatically retrieve all the latest data and will resume control, again with no interruption.

INTEGRATED SOLUTION FOR SAFE, ECONOMICAL OPERATION

Different controllers are addressed from the control station, and by using Profinet the existing network structure can continue to be used. As the standard fieldbus, Profibus replaces the inconvenient serial connections and expensive special plugs with Industrial Ethernet. This provides considerably more functions, simpler operation and greater speed. It also spares TCVVV AG the time and expense of special cabling.

straton checks via its Profinet link five Wago 750-340 Profinet devices at a distance of 30 to 40 metres and, as a soft PLC, controls various steam boilers using these fieldbus couplers and retrieves temperature values for archiving in the control system, where they are analysed in trends. Analog signals from the boilers are retrieved and the relevant valves controlled. The cycle time is 100 ms.

However, straton is used not only on the I/O level. Being a versatile tool and an embedded solution, it also carries out important functions in controlling the pressure compensating tank. For safety reasons, the standard requires that a hard PLC should
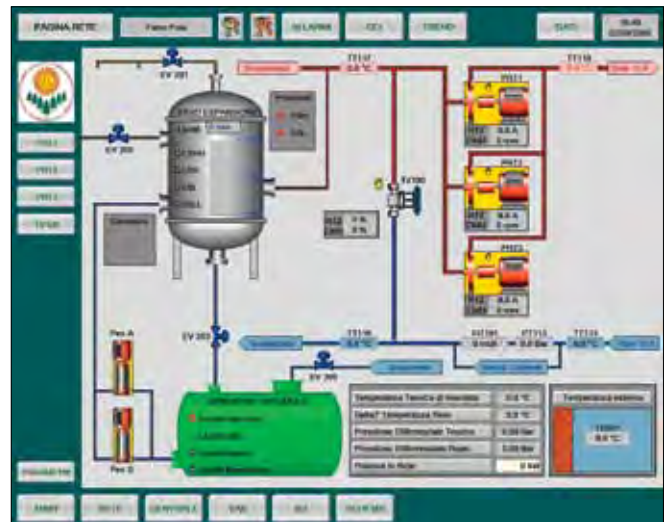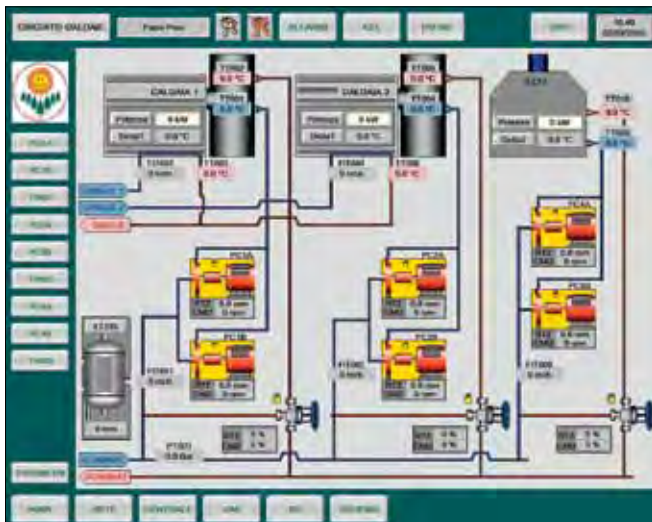
be installed. Even if the device loses its link with the network, it is essential to ensure that the tank is carefully controlled. The device selected was a Wago 750-860 fieldbus controller in which straton, embedded as a runtime PLC, ensures reliable performance. As an embedded solution, straton is particularly convenient for the end customer as it simply needs to be unpacked and connected. All the configuration modules are created using the straightforward intuitive straton configuration tool with its graphical interface, and variables are linked via a menu or using drag-and-drop techniques. The district heating plant in Santa Caterina benefits above all from the extremely productive integration between straton and zenon. Both straton and zenon can be operated as redundant systems with just a few mouse clicks. Only two PCs are needed to implement a redundant system: all straton projects, just like visualisation running under zenon, will run on a single PC. The second computer is present in a stand-by capacity. This combination of redundant visualisation, soft PLCs and fieldbus I/O produces a highly secure solution that is very easy to configure and can, moreover, be implemented affordably. The straton projects, like the visualisation modules, are configured in the zenon editor. Software engineer Fabio Pola comments: "We found this integrated solution especially effective from the point of view of configuration. Not only do the visualisation module and the PLC share the same database, but the same, familiar editor can also be used to configure different target systems."

The versatility offered by straton is demonstrated by the way it can operate as a gateway for an ABB gas measuring device. Interestingly, the gas measuring device has only analog outputs and needs to interface to another control system that monitors the gas concentration and is used for certifying the system. straton therefore uses the Profinet couplers from Wago to read out the values, and then makes them available to the control system via Modbus. In this situation straton is acting as a slave, but it could also act equally well as a master. But another point illustrated by straton and zenon in Santa Caterina is how easily existing systems can be integrated into a project. In parallel with the district biomass heating plant, a collective boiler also had to be integrated with the visualisation and control modules. This "VAS" boiler is controlled with an S7-300 which is linked directly to zenon by using a dedicated S7-TCP driver. The alarm sensor and analog data, for instance, can be evaluated simply without any need to invest in any additional hardware or software.

KNOWING WHAT'S GOING ON

Data produced during ongoing operation is available at all times. It is collected by straton and zenon and archived by zenon. The plant operator alone makes the decision regarding where these archives are stored. If they wish, zenon can even write archives direct to databases, ensuring that no data is lost in the event of system failures. Like on-line data, archived data can also be displayed at any time in the form of an informative trend display:

The Extended Trend feature in zenon converts historical and current values into smooth curves. This feature gives full control over curve parameters, axis configuration, zoom factor and much more. Any number of curves can be displayed simultaneously, even if their scaling varies. Since the Extended Trend can display two time axes at the same time in the same chart, it is simple to compare different time periods or batches.

QUICK AND SECURE CONFIGURATION

TCVVV AG succeeded in commissioning its district heating plant within 12 months. It didn't take long to get zenon configured either. Klaus Rebecchi from COPA-DATA Italia commented: "The TCVVV AG engineers are particularly enthusiastic about the way all the details, including straton, are configured in a single development environment. In other words only one tool is required, and it takes next to no time to learn how to use it."

This brings down both training and running costs considerably, and at the same time reduces dependence on outside experts. The redundant technology increases operational reliability and ensures that the control system is available at all times.

Software engineer Fabio Pola comments: "zenon and straton have enabled us to make use of innovative and affordable PC-based technologies with our existing Ethernet, and to communicate directly with the PLCs from a PC. This solution has significantly reduced our investment and maintenance costs."