ENGINEERING
TOMORROW

Case Story

Tuzla follows the **green track**

Tuzla, Bosnia-Herzegovina - By Journalist Jesper With

70%
of buildings connected to district heating system

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The Bosnia-Herzegovian city of Tuzla wants to be green - and is right on track

So far, 70% of all buildings in the city have been connected to the district heating system and the network is gradually being optimized. In the near future, two hospitals, one of them a big regional center, will be connected as well.

Amer Karabegovic is satisfied. From being a city with a high level of air pollution due to individual heating by the use of brown coal and oil, Tuzla has gradually enlarged its district heating network. At the same time, the existing system has undergone major modernizations to make the city much more energy efficient today than it was 5 years ago.

"Individual heating by the use of brown coal is stinky and unhealthy, so we have been working hard on replacing such ways of heating with district heating. And we make good progress. The only big brown coal users left are now the Dragodol area and the city's two hospitals. We will connect these in 2010", Amer Karabegovic says. He is development department manager at the Tuzla district heating company, called Centralno Grijanje Tuzla.

550 substations are now installed in buildings around Tuzla, app. 300 of them are compact stations. More than 200 of these are from Danfoss. Big substations (195 - 1200 kW) are supplying tall blocks of flats, others (60 - 190 kW) are supplying small and medium-sized buildings and finally a small type of substation (20 - 55 kW) is used for individual houses. 150 km of pipeline is ensuring that surplus heat from the coal-fired Tuzla Power Plant reaches the customers.

Immense improvements

Amer Karabegovic and his colleague Esad Trumic, director of distribution at Centralno Grijanje, take us on a little tour around the city. In a 15-story building, that used to be heated by a rather ineffective heating system, a new substation from Danfoss has been installed in a small boiler room in the basement "Our rule is that every building must have its own substation. In that way consumers get a more stable heat supply and they get a much more comfortable temperature level. Before, the residents had overheated apartments in the winter - often 28 degrees, which is much too warm - and therefore they opened the windows to bring down the temperature. A terrible waste of energy! Now they have 22 degrees. It is still too high, but much better than before, and the residents are really happy", Amer Karabegovic explains.

"However, there are no flat stations in the building, so the residents still cannot regulate the system temperature themselves. Therefore there is still room for improvements", adds Esad Trumic, the director of distribution. Moreover, the substation does not handle domestic hot water. There were no pipes built for hot water when the building was constructed. Instead residents get hot water through an individual boiler running on electricity, which is not the most energy efficient system.

"Still, the improvement in a building like this is immense. The quality of life is higher than before and the energy bill is lower. Furthermore, the district

The boiler room under a 15-story building in central Tuzla: An employee from Centralno Grijanje checks and notes down data of consumption and variations in temperature between this new Danfoss substation and the building. It is a huge improvement of life quality for the residents.

Danfoss substations installed in Tuzla - some facts

The district heating system of Tuzla has a total number of 550 substations. There are about 300 state-of-the-art substations; here app. 70% of these are supplied by Danfoss:

Danfoss substations, type:

- Danfoss Termix VX-W (20-55 kW heating, for wall mounting), 60 pcs.
- Danfoss HKL (60-1200 kW heating, floor standing), 150 pcs.

Technical data for the heating system:

- Pressure level: PN 25/16
- Design temperatures for heating: 145/75° C - 90/70° C (radiator heating)

heating company, owned by the city of Tuzla, saves a lot of money, which can be invested in other improvements. The company is the main contributor to making the city more energy efficient", Kemal Lojo, project manager from Danfoss Croatia says. He has joined us in Tuzla, since Danfoss Croatia is tending the Bosnia-Herzegovian market as well.

Computerized monitoring system

Many of the 550 substations in the city system are indirect substations with multiple heat exchangers and with less regulation from primary side. But today the district heating company is only implementing compact heating substations with full regulation of temperature and flow on primary side and also with regulation on the secondary side. This saves energy. Approximately, it decreases the consumption in buildings like this with 20-30 %.

Another energy saving tool is the SCADA system, which 36 substations are connected to by the use of remote control. "We control all data from this building on our computer screen. We can remotely control all parameters in the building and control how temperatures are going up and down in the substation.

The city council has decided to improve the energy efficiency over 5 years. We therefore also optimize the software (Termis), by using the Danish company 7 Technologies. Their software optimizes the operation of our district heating network. By connecting their software to SCADA, we can predict and optimize the consumption and in this way improve the efficiency a lot", Amer Karabegovic says.

Pazar area connected

A central area of Tuzla, the Pazar area, was not connected to district heating during the Yugoslavia regime. Only larger houses were connected, whereas the 12-unit apartment building we visit here in Pazar was connected for the first time in 2009. The area only consists of single-family houses and smaller apartment buildings which had to manage with individual heating. The 90 kW substation supplies all 12 apartments with heating. Like in the 15-story building we visited before, the residents pay the bill according to the number of square meters, since there are no flat stations with heat meters in each individual apartment.

An employee from Centralno Grijanje shows us the substation in the basement. Once a day,he checks and notes down data of consumption and of variations in temperature between the substation and the building.

"This substation will not be connected to the SCADA system, but we want to follow very carefully how the building reacts now when district heating is installed. It gives us know-how which can be used in future projects", Amer Karabegovic says.

District heating instead of brown coal

Bosnia-Herzegovina suffered a lot during the war in Yugoslavia. Arriving at a hillside covered with single-family houses, Amer Karabegovic explains that the city is nevertheless lucky due to one thing: Having the district heating system makes it possible - without very big investments - to get a mo-

82-year-old Dina Kunosic from Amalija Street in Tuzla is happy about having changed from an individual heating system fired by brown coal to Tuzlas district heating system. The energy bill is lower and for the first time she has a stable heat supply which creates no brown coal related pollution. Her low pension did not make it possible to connect, but a reduced price, the possibility to pay off in rates and some help from family changed things so that she managed. Her own substation unit is seen behind her.

dern energy efficient heating system prepared for the future. The houses here on Amalija Street did not have a good heat supply before. People had different individual heating systems fired mostly with brown coal, which created pollution and an unpleasant sweet smell in the city.
"We connected all the houses in this street to our system by installing a substation outside each house in a box (the size of a telephone box). The price of 3-4,000 € to be connected is expensive for many people, but we gave them a lower prize and the possibility to pay off in rates", Esad Trumic says.
The price of using brown coal was not much higher than receiving district heating. "However, you have a much bigger comfort, there is no pollution, which was a big problem before, and you have a much more reliable heat supply all over your house. Not just in some of the rooms. So everybody wants district heating, the question is only how to finance the investment in order to get connected. Therefore, it is fine that the district heating company helps people in this situation", Samir Džomba, engineer at Danfoss says. From his sales office in Sarajevo, the capital, he is representing Danfoss in Bosnia-Herzegovina, and he knows that this is a crucial point. After being connected, basically nobody is dissatisfied. The advantages are so much bigger.
Since air pollution is an old problem in Tuzla, UNDP (United Nations Development Programme) is supporting the city in getting rid of the last big areas where brown coal or oil is being used. The Dragodol area and the two hospitals are part of this project that will solve a big part of the remaining problem with air pollution. Consequently Tuzla has achieved to become a much greener city and its CO2 emissions are now low compared to other cities of its size.

Development of district heating in Tuzla

Tuzla has 170,000 inhabitants.
The city's final goal is to connect as close to 100% as possible to the district heating network. Until now, 70 % have been reached and during 2010 this number should increase.

Before arriving in Tuzla from the north, we pass the Tuzla Power Plant a few kilometers outside the city. It is a surprisingly huge construction, built back in times of the Yugoslavia regime to supply a larger part of Bosnia-Herzegovina with electricity - and at the same time supply Tuzla and a few smaller towns with heating as well. The co-generation plant is the largest in the country and was the third largest in former Yugoslavia. The owner, Electro Privreda Bosnia-Herzegovina, is a state owned energy company managing power generation and distribution.
After modernizing and enlarging the district heating system of Tuzla, the power plant is the largest problem for the city since it is an outdated and ineffective power plant based on coal. Bosnia-Herzegovina probably has the largest amount of coal reserves in the Balkan area and therefore it is expected that the country will not switch to other energy sources. But it is the hope of the government to close down the old plant and build a new effective combined heat and power plant that can produce 700 MW electricity and deliver 4-500 MW of heat energy.
Moreover, Tuzla has a plan to build a plant based on waste incineration. Four regional waste disposal sites exist in the Tuzla region. Experts estimate that there is enough garbage for building an incineration plant and use the surplus heat in the district heating system.

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