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Belgrade demo site

Introduction

Belgrade is the capital of Serbia with about 2,000,000 inhabitants. It has a moderate continental climate. In charge of the heating of more than 50% of apartments is PUC “Beogradske elektrane”, a district heating company founded in 1965. The heating season lasts for a maximum of 7 months. With the installed power of 3GW in 40 heat sources, an annual production of heat energy of 3600 GWh, a district heating network of 750 km long and 9000 substations, it is one of the largest heating systems in the region.

The heating system is divided into 5 DH networks: Novi Beograd, Dunav, Konjarnik, Cerak and Vozdovac.

Regarding heat sources, the most used are natural gas and fuel oil. The approximate natural gas consumption is 350 million m³/year, about 46,000 tons of fuel oil, about 3,200 tons of coal, 500.000 liters of heating oil, 2,000 tons of wood pellets.

Content

The RELaTED ULT concept and technologies will be tested in a subset of the network. The demonstration site for RELaTED consists of two different interventions to be performed within the same district:

- A subnetwork comprising 5 multi-story residential buildings.
- An educational building (School).

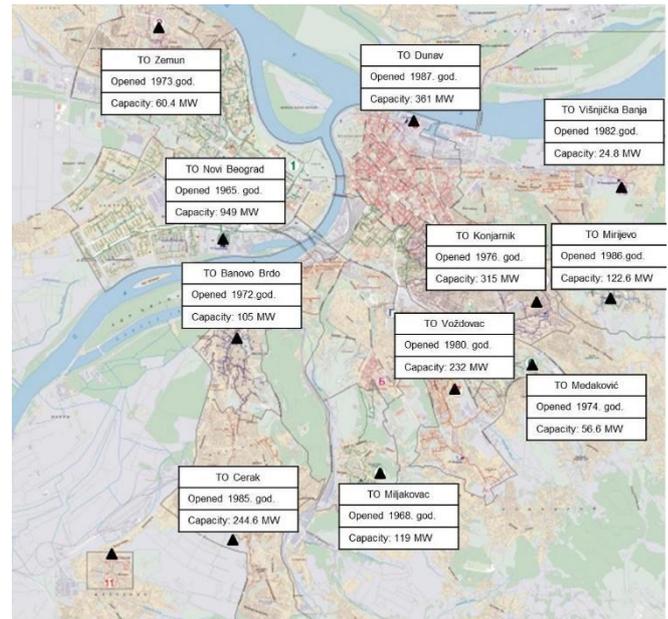


Figure 1. Heating plants and respective capacity in MW in Belgrade's DH.



Figure 2. Aerial image of the residential buildings

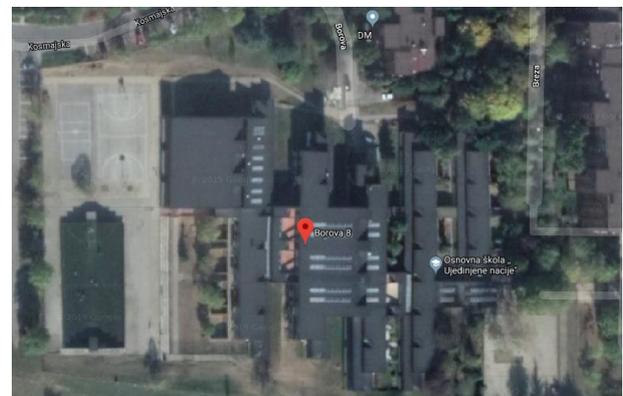


Figure 3. Aerial image of the School



New Heating and Cooling Solutions

using low grade sources of thermal energy

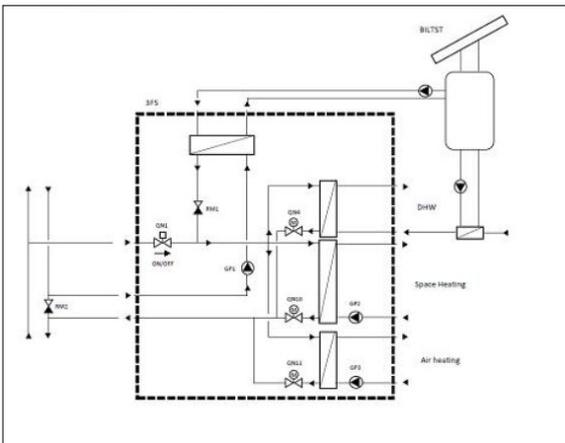
The intervention plan in the residential buildings consists of the reduction of the supply line temperature in the respective subnetwork. This reduction may be progressive from the current operation temperature up to LT temperature range. Intervention is planned as:

1. Intervention in primary substation to perform detailed measurement of distribution loss & adaptation for temperature reduction.
2. Reduction of network working temperatures.
3. Verify comfort status in critical apartments.
4. Heat balance of network to be calculated.

The intervention in the School has 3 main activities.

- Passive activities to reduce the heat consumption indoors which consists of replacement of the current windows by new ones (this activity was already in progress before the start of RELaTED and is out of the scope of the project) and the installation of radiator thermostatic valves.
- The installation of a new solar thermal system (BILTST, glazed) on the east-facing sloped roof will be carried out and finally, for the connection of the ST to the overall heating system a retrofitting of the current substation will be made. The new substation will be a variant of the 3FS in RELaTED, comprising only 2 functions. This 2 Function-Scheme (2FS) substation will allow the connection of BISTs to the standard DH system.

Figure 4. Connection scheme of the 2FS



- New 2 FS concept design will allow:
 - o Extraction of LTDH for DHW, space heating and air heating supply.
 - o Injection of heat from the BILTST system to the DH return line.
 - o Pre-heating of the DHW by the BILTST system.

Conclusion

The RELaTED concept that will be applied to 2 demo sites will allow to reduce heat losses and the energy required from the heat plant. Applied in the future to the entire heating area, it will have the effect of significantly increasing energy efficiency and making a major contribution to the decarbonisation of the system.