Heat pumps against air pollution and rising water table

Milan is one of the Continent's most polluted cities, threatened by air pollution, especially during the cold season and under inverse conditions, when the cold and heavy air close to the ground will have no upward thrust. In such a situation, air pollution will accumulate and concentrations of poisons increase alarmingly. Further, the Milan area has been affected by a raising water table since the early 90s, causing serious damage to underground structures and threatening buildings. The main cause is due to the significant reduction of water drawn from wells by the industry. These two factors were the main reasons that A2A together with the City authorities decided to develop various district heating networks and finally to use groundwater alimented heat pumps for heat production, thus taking action against the growing deficit of the hydrogeological balance and against air pollution.

The Canavese cogeneration plant

The cogeneration plant for the district heating area of east Milan is located on the site of the former gasworks. It was built in 2007/2008 and consists of the following facilities:
- a section of high-efficiency cogeneration with gas engines
- a large high temperature heat pump for the exploitation of geothermal energy from groundwater
- Large thermal storage tanks
- gas boilers to cover peak energy demand
The heat pump operates mainly at night and produces hot water which is stored in the large storage tank. During daytime, the heat energy accumulated in the storage tank is distributed through the district heating network to the connected users.

Main technical data

<table>
<thead>
<tr>
<th>Operating Seasons:</th>
<th>Autumn - Winter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating capacity:</td>
<td>15'500 kW</td>
</tr>
<tr>
<td>Cooling Capacity:</td>
<td>11'800 kW</td>
</tr>
<tr>
<td>Hot water in/out:</td>
<td>65 °C / 90 °C</td>
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<tr>
<td>Cold water in/out:</td>
<td>15 °C / 7,6 °C</td>
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<td>COP:</td>
<td>2,7</td>
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</tbody>
</table>

Friotherm AG
Langfeldstrasse 104
CH-8500 Frauenfeld
Switzerland
Tel. +41 (0)52 724 77 00
E-Mail info@friotherm.com
Internet www.friotherm.com