Using industrial excess heat from industry.

The A2A project «Heat in Network»

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Agenda

- A2A Group – Company profile
- The District Heating in A2A
- The project «Heat in Network»
A2A company profile

**A2A is the multiutility** born on 1st January 2008 as a result of the **merger between AEM SpA Milan and ASM SpA Brescia** with the **contribution of Amsa and Ecodeco**, the two environmental companies acquired by the Group.

In 2014:

- More then 12.000 colleagues
- 5,0 bl € revenues
- 1,0 bl € ebitda
- A2A is listed on the Italian Stock Exchange (cities of Milan and Brescia are the main sharelders with 27,5 % each)
A2A Company profile

- **is one of the main players** in the environmental sector in Italy with approximately 3 million tons of waste treated

- **1st place** between the former Italian public utilities companies in terms of clients and turnover

- **1st place** in Italy in the district heating sector (2,0 TWh of heat sold)

- **2nd place** in Italy in terms of installed electric capacity and volumes of sales

- **3rd place** in Italy in terms of gas sold

A2A Calore & Servizi, the DH&C company of the Group, is part of:
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- A2A Group – Company profile
- The District Heating in A2A
- The project «Heat in network»
The modern concept of DH
## District Heating – The A2A Key Figures

<table>
<thead>
<tr>
<th>Location</th>
<th>ET Delivered</th>
<th>Volume</th>
<th>Network</th>
<th>Building</th>
<th>Power Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brescia</strong></td>
<td>1.1 TWh</td>
<td>&gt; 41 Mm³</td>
<td>&gt; 370 km</td>
<td>&gt; 19,000</td>
<td>720 MWt</td>
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<tr>
<td></td>
<td>✓ WTE: 59%</td>
<td></td>
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<tr>
<td></td>
<td>✓ CHP: 39%</td>
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<tr>
<td></td>
<td>✓ Other: 2%</td>
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<tr>
<td><strong>Milano</strong></td>
<td>0.8 TWh</td>
<td>&gt; 33 Mm³</td>
<td>&gt; 200 km</td>
<td>&gt; 2,000</td>
<td>771 MWt</td>
</tr>
<tr>
<td></td>
<td>✓ WTE: 23%</td>
<td></td>
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<td></td>
<td>✓ CHP: 36%</td>
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<td></td>
<td>✓ GEO: 7%</td>
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<td></td>
<td>✓ Other: 34%</td>
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<tr>
<td><strong>Bergamo</strong></td>
<td>0.15 TWh</td>
<td>&gt; 5 Mm³</td>
<td>&gt; 55 km</td>
<td>&gt; 500</td>
<td>120 MWt</td>
</tr>
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<td>✓ WTE: 57%</td>
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<td>✓ CHP: 7%</td>
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<td>✓ Other: 36%</td>
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</tbody>
</table>
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• The project «Heat in network»
The European energy balance: the opportunity

*Figure 2 – European Energy balance 2003*
The project «Heat in Network»

The project “Heat in Network" intends to exploit the opportunities of excess heat from industrial production to be used in the DH of A2A.

The process involves:

- the identification of opportunities on the territory also through the sales force;

- the contacts with the potential supplier of excess heat to check the availability of the initiative;

- the need for a technical inspection to verify the feasibility;

- the preparation of technical and economic agreement between the parties.
Ori Martin – DH in Brescia

Founded in 1933, is now a modern EAF steel mill for production for special applications in the automotive business. It is also equipped with special thermal treatments.

Ori Martin care as much for the external environment as for the internal one and it has always considered this as an important part of the company's mission. This policy has been followed with investments linked with the protection of the environment of about 23% of the total investments of the last 4 years.

Intervention of energy recovery with steam boiler used to produce electricity through ORC turbine and transfer heat to the district heating network.

Thermal power:~ 6 MWt

Estimated annual energy recovered: 30 GWh/year.

Expected start: before the end of 2015
Ori Martin SpA – DH network in Brescia

560 m of pipeline (DN 200 e 250)
VetroBalsamo – DH in Sesto San Giovanni

Vetrobalsamo was born in 1938 as a handicraft workshop. It produces special glass bottles, the company is well integrated in the urban structure of the city. It produces over half a million bottles a day for the European market of wine, beer, oil and any other drink.

Vetrobalsamo reduced by **70% flue gas emissions** compared to other traditional glassworks, as they are the only plant in Italy that installed oxy-fuel furnaces. They use **85% recycled glass**, putting themselves at the top of the list of the European recycling companies.

The production cycle is in operation 24 hours a day on two lines. Intervention of energy recovery with steam boiler for heat transfer to the district heating network.

**Thermal power:** ~ 4 MWt

**Estimated annual energy recovered:** 20 GWh/year.

**Started, total production expected before the end of 2015**
Waste Heat from Industry (WHI)

The recovery of heat from industries (WHI) has similar issues to the electricity sector (subject to Regulatory Authority) given the significant increase caused by the spread of private plants to renewable sources (solar, wind) and the “merit order”.

The issues that the district heating sector is facing are the same, with some differences related to the different systems of production and transportation of energy and greater freedom of action given the lack of regulation of the sector.
WHI: characteristics of production

The main features of the Waste Heat from Industry (WHI) are:

1) Discontinuity of the production:
   - Production cycle: production cycle time (ex: industrial furnace), production related to electricity cost, etc.
   - Working time: daily working time (8h/24h), plant shutdown during the weekend, stop working during maintenance periods, stop during holiday periods (ex: Christmas - New Year – summer holidays), etc.
   - External events: market trends, strikes, etc.

2) Variability of production: even when the plant is in production the instantaneous power produced is variable.

3) Expected life of production depend on the economic evolution of industrial activity.
WHI: impact on the other heat sources

Install equipment at the WHI site supplementing these variable characteristics involves investments that can make the connection not economically possible.

The system operator must have and maintain auxiliary systems of heat production to compensate, in case of unavailability of heat from WHI, with rapid start.

For these features WHI plants are sources that contribute to the energy needs of the DH network but it is very difficult that they can increase the availability of total power.
WHI: network management

The impacts of the WHI plants on the DH network management are similar to those caused by renewable energy plants on the electricity grid: difficulties to adjust the parameters of service delivery to customers (ex: temperature, delta pressure).

The importance of these impacts are minimal as long as the share of instantaneous power produced is residual compared to that required by the network, but it can become relevant if the share of instantaneous power is significant (eg summer periods, winter nights).
WHI: economic issue

Main economic aspects:

- heat price;
- take or pay or penalties for not-delivery heat;
- sharing of costs:
  - development of the DH network;
  - implementation of the WHI substation (exchanger, pumping system, ...);
  - supply of electricity for the WHI substation;
  - substation maintenance.

The CAPEX and the ownership of the WHI substation could be one of the issue of the negotiation.
WHI: technical issue

Some technical aspects:

- characteristics of the equipment that controls the operating parameters (ex: maximum pressure, maximum temperature).

- remote control systems of the substation / equipment by the network operator.

- switching sequences to connect or disconnect the WHI from the network;

- mode of automatic disconnection of the system if the parameters are not correct;

- safely access to the substation / equipment by network operator staff.
Thank you for your attention