Geothermal projects of HUNOSA. Barredo Colliery District Heating

HUNOSA
Noel Canto Toimil
Head of Department of Innovation
Where are we?

- HUNOSA. Founded in 1967
- Integration of coal mining private companies
- Coal extraction: underground and open pit
- More than 70 collieries and more than 2,000 mountain mines
- 26,590 employees

HUNOSA nowadays
- One underground mine in operation
- Power station (50 MW_e) + CO_2 capture plant
- Washery
- Diversification activities
Flooding after mine closure

Keeping a safety water level to avoid damaging buildings, infrastructures, etc.

Permanent pumping costs.

Geothermal energy:

- source of income to offset pumping expenses
- renewable resource with mine water (from being considered a waste product to being a resource)
Geothermal energy. Our facilities

INITIAL FACILITIES
(in operation since 2014 - 2016)

BARREDO COLLIERY DH
(in operation since 2020)

Hospital of Mieres
Research Building
(University of Oviedo)
Asturian Energy
Foundation (FAEN)
High School
“Bernaldo de
Quirós”
Residential
buildings
(M9 and M10 in
Vasco – Mayacina)
Main building
University of
Oviedo (Campus
of Mieres)

(heating and cooling)

(heating and pre-heating of domestic hot water)

El Fondón District Heating
(under construction)
• Residential building
• Public Health Centre
• Hotel
• Geriatric Centre
• Sport Centre

Plan to develop geothermal projects in other mines

<table>
<thead>
<tr>
<th></th>
<th>Installed Power (kW)</th>
<th>Energy Supplied (MWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barredo Colliery</td>
<td>6.650</td>
<td>10.038</td>
</tr>
<tr>
<td>Initial facilities</td>
<td>4.650</td>
<td>7.395</td>
</tr>
<tr>
<td>Barredo DH</td>
<td>2.000</td>
<td>2.643</td>
</tr>
<tr>
<td>El Fondón Colliery</td>
<td>1.450</td>
<td>3.448</td>
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</tbody>
</table>
Geothermal energy. Barredo Colliery

Goethermal facilities linked to Barredo Colliery

- Mine connected hydraulically with other mines
- In operation from 1937 to 1995
- Depth: 355 m
- Number of levels: 5
- Annual pumped water from Barredo Colliery $\approx 4 \text{ Hm}^3$
  (Total HUNOSA $\approx 35 \text{ Hm}^3$ per year)
- Water temperature: 23 ºC (constant)
Geothermal energy. Barredo Colliery DH

<table>
<thead>
<tr>
<th>Building</th>
<th>Installed power (kW)</th>
<th>Thermal energy supplied (MWh)</th>
<th>CO₂ Emission reduction (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main building UO</td>
<td>2.000</td>
<td>1.424</td>
<td>359</td>
</tr>
<tr>
<td>Secondary School</td>
<td>500</td>
<td>169</td>
<td>43</td>
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<tr>
<td>Residential building M9</td>
<td>720</td>
<td>500</td>
<td>126</td>
</tr>
<tr>
<td>Residential building M10</td>
<td>840</td>
<td>550</td>
<td>139</td>
</tr>
<tr>
<td>Total heating</td>
<td>4.060</td>
<td>2.643</td>
<td>666</td>
</tr>
</tbody>
</table>
Geothermal energy. Barredo Colliery DH

Barredo District Heating generation room

Condenser circuit

Evaporator circuit

Safety water level: 37 m

2 pumps: 90 kW - 330 m³/h each
85 m – 95 m depth

T² = 75 °C

Secondary School

T² = 80 °C

Main building
Univ. Oviedo

T² = 65 °C

Residential building
M9

Residential building
M10

T² = 60 °C

T² = 50 °C

T² = 40 °C

Barredo District Heating pumping system

Barredo District Heating heat pumps
Geothermal energy. Barredo Colliery DH

• INTERNATIONAL ENERGY AGENCY - 6TH GLOBAL DISTRICT ENERGY CLIMATE AWARDS 2019

• “Integrating renewable and waste heat and cold sources into district heating and cooling systems”. 2021 Joint Research Center – European Commission

• Selected as an endorsed nominee for: RUGGERO BERTANI EUROPEAN GEOTHERMAL INNOVATION AWARD 2021

AWARD OF EXCELLENCE in the category of EMERGING MARKET
Thank you very much for your attention