



Development of “Closed loop” power plants in high temperature geothermal systems

Drilling challenges

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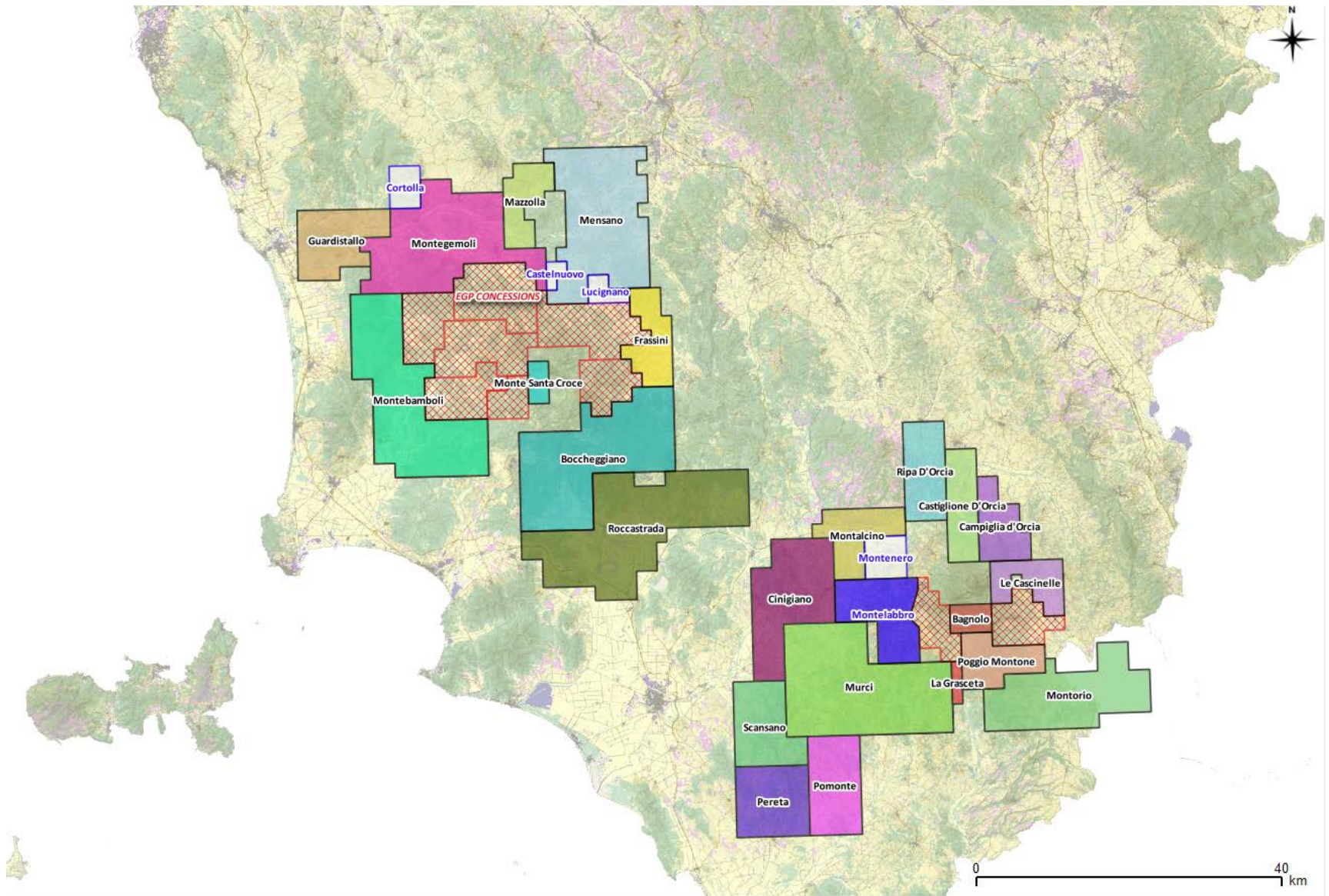
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GEOHERMAL DEVELOPMENT IN ITALY



SUSTAINABILITY ISSUES

- **LONG TERM PRODUCTION DEPLETION**
 - 50 -70 % OF TOTAL FLUID PRODUCED IS DISCHARGED INTO ATMOSPHERE
- **ENVIRONMENTAL IMPACTS**
 - **AERIFORM EMISSIONS**
 - DROPLETS CONTAINING POLLUTANTS (B, As,Hg, ...)
 - GREENHOUSE GASES (CO₂, CH₄,)
 - UNPLESANT SMELL (H₂S)
 - OTHER VOLATILE POLLUTANTS (NH₃, H₂, N₂, Rn,...)
 - VISUAL IMPACT ON THE LANDSCAPE
 - SUBSIDENCE

Who we are Companies:



KNOW HOW

Identification of geothermal resources

Design and plant construction

Development and management of production facilities

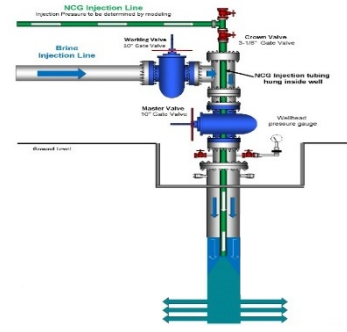
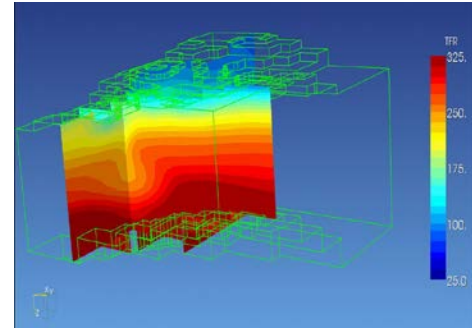
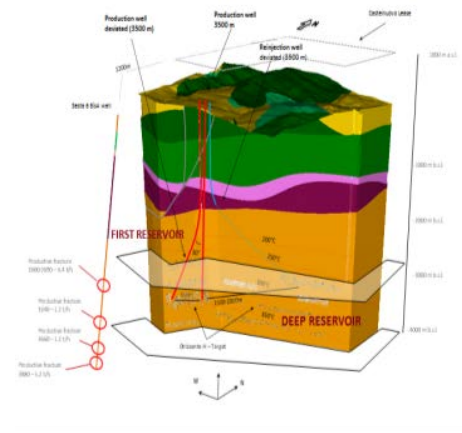
SUSTAINABLE GEOTHERMAL DEVELOPMENT

“ Closed loop” systems need to be applied also in high temperature - high NGCs content deep geothermal reservoirs to allow:

- Total re-entry of the geothermal fluid produced in the geological formations of origin, with no steam and gas emissions into the atmosphere;
- Integration in the landscape (“site-specific design”)

***ZERO EMISSIONS” POWER PLANTS
ARE BECOMING MANDATORY IN MANY COUNTRIES
TO ACHIEVE THE SOCIAL ACCEPTANCE***

CASTELNUOVO “CLOSED LOOP” PILOT PROJECT



DRILLING TECHNOLOGY CHALLENGES

TO MITIGATE ENVIRONMENTAL & SOCIAL ISSUES

- Drilling fluids
- Acoustic Noise
- Land use (smaller foot print, directional/multilateral,...)
- Water use
- Air emissions during flow test and drilling operations
- Non condensable gases injection