



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

## Drilling challenges

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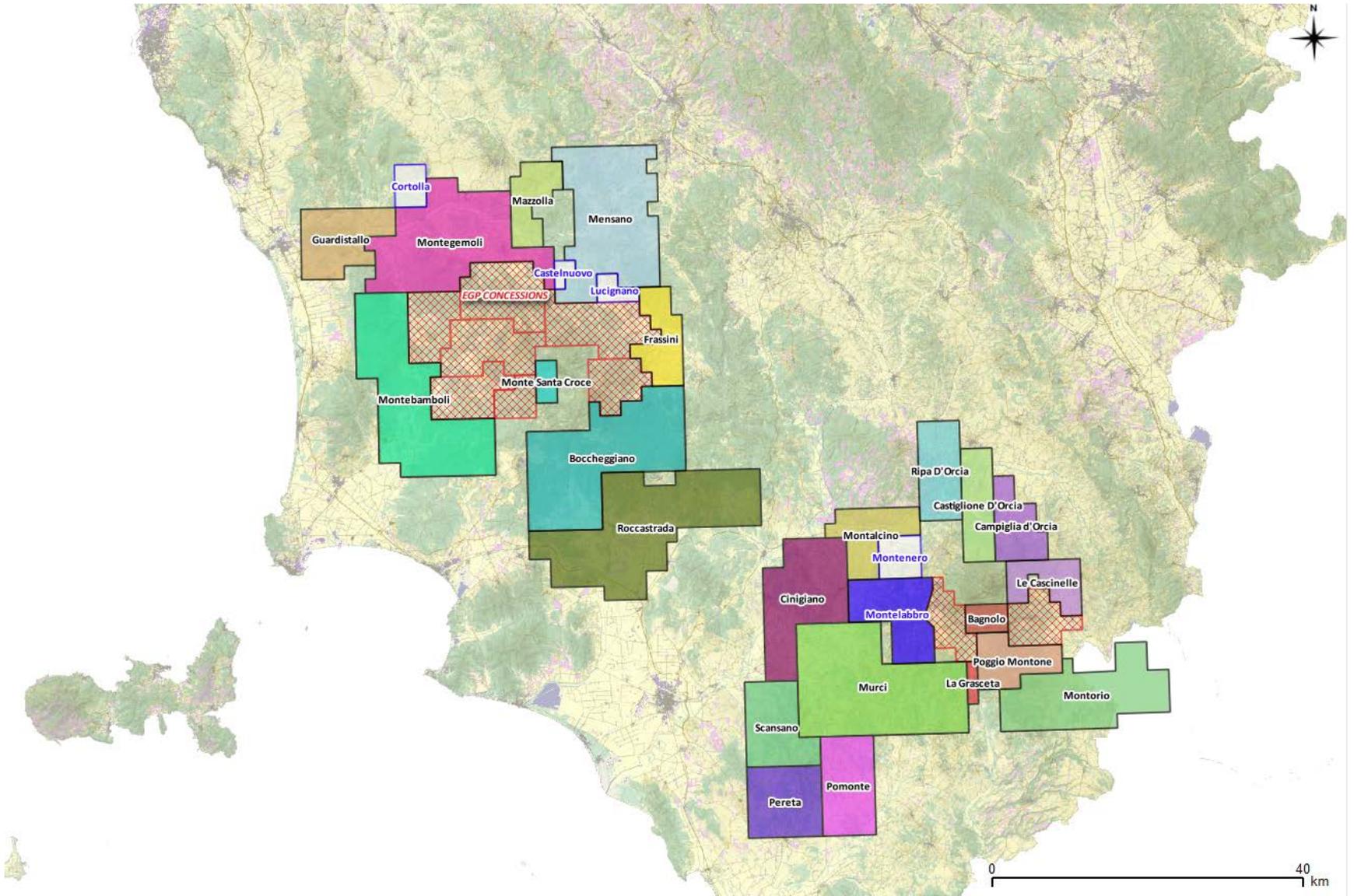
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# GEOHERMAL DEVELOPMENT IN ITALY



# GEOTHERMAL DEVELOPMENT WORLD WIDE

## 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 (CO<sub>2</sub>, CH<sub>4</sub>, )
    - UNPLESANT SMELL (H<sub>2</sub>S)
    - OTHER VOLATILE POLLUTANTS (NH<sub>3</sub>, H<sub>2</sub>, N<sub>2</sub>, 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

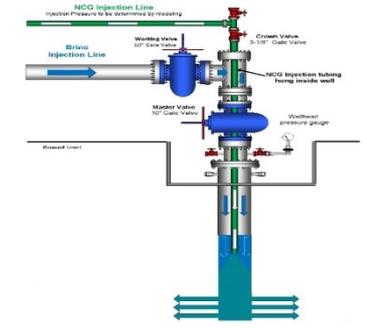
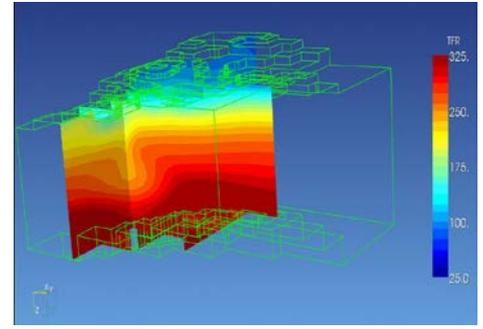
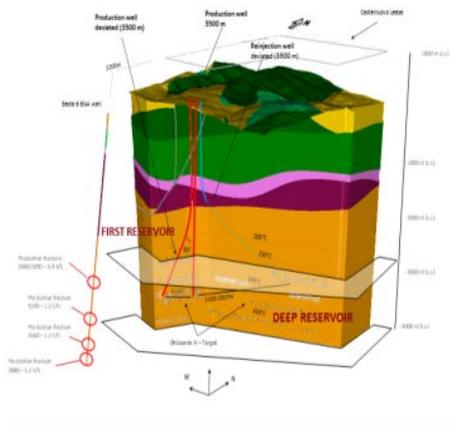
# SUSTAINABLE GEOTHERMAL DEVELOPMENT

“ 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



castelnuovo tecnico.mp4



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# 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