



# « The competitiveness of renewable cooling solutions »

Renewable Cooling: a strategic role to reduce costs of externalities

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# 01-Context

WP4 focuses on the business models and project funding for renewable cooling solutions, specifically looking at the economic and technical feasibility of geothermal and solar cooling technologies

@AFPG- [Study of geothermal energy in air conditioning and cooling](#)

## Key messages:

- The economic viability of renewable solutions for heating & cooling applications
- The necessity to integrate externalities linked to the use of conventional cold solutions in our analyses



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# 02-Methodology – cost-benefit analyse

1. We are interested in a “**living area**” – for example a capital
2. We identify **main typologies** of buildings using cold :
  - health establishment,
  - shopping centre,
  - Residential
3. For each, the **energy needs** are considered according two variants:
  - One as the “solution of reference”
  - One with a reasonably efficient geothermal solution, to satisfy hot and cold needs.



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# 02-Methodology – externalities evaluation

1. Urban heat islands :
  1. We identify them by comparing “in the city” and “nearby” weather stations.
  2. We consider that the transition to 100% geothermal energy only erases part of heat islands’ effects: those are indeed not only linked to buildings’ cooling needs.
2. We only retain the two most significant externalities:
  1. Loss of productivity at work (impact on gross “local” product).
  2. The increase in mortality.

⇒ In the presentation, we made the choice to impute the cost of externalities to the cost of the “reference” solution (25 years).
3. We are targeting 3 “representative” capitals due to their diversity Rome, Bucharest, Paris.



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# 03-Results – Collective buildings

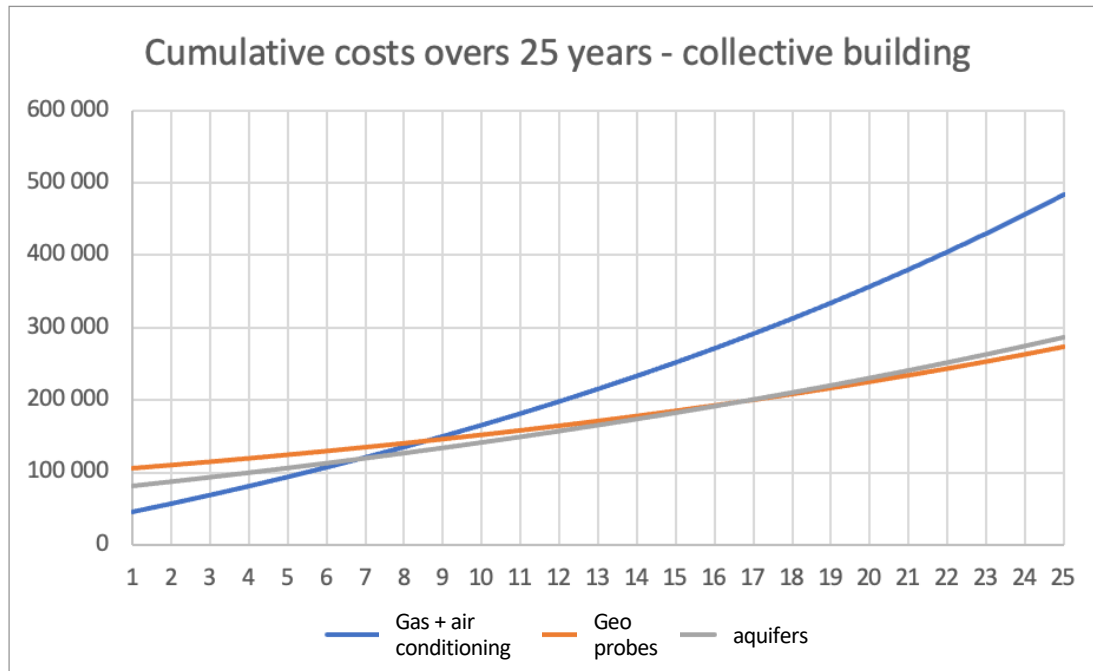


Figure 4 Cumulative costs for a collective building

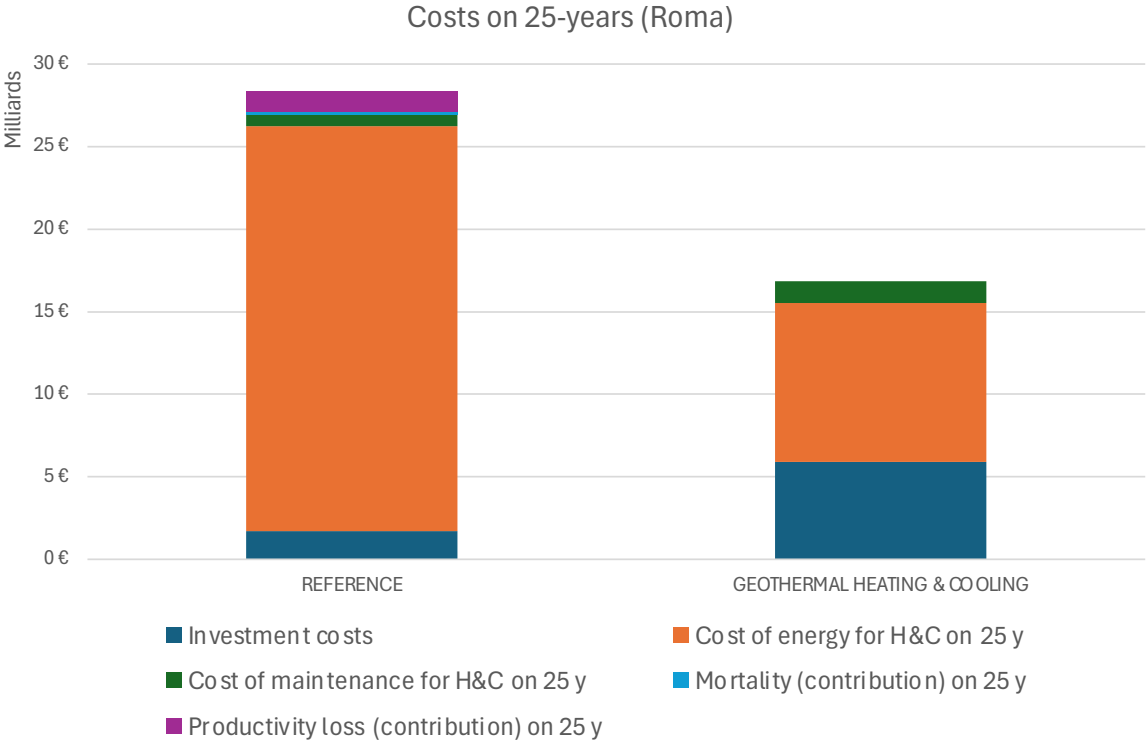
## Cost-benefit analyse

Geothermal solutions become more profitable than the alternative solution :

- after only 7 years for the groundwater geothermal solution and
- 9 years for the geothermal probe solution, which represents a considerably reduced duration

# 03-Results – Roma

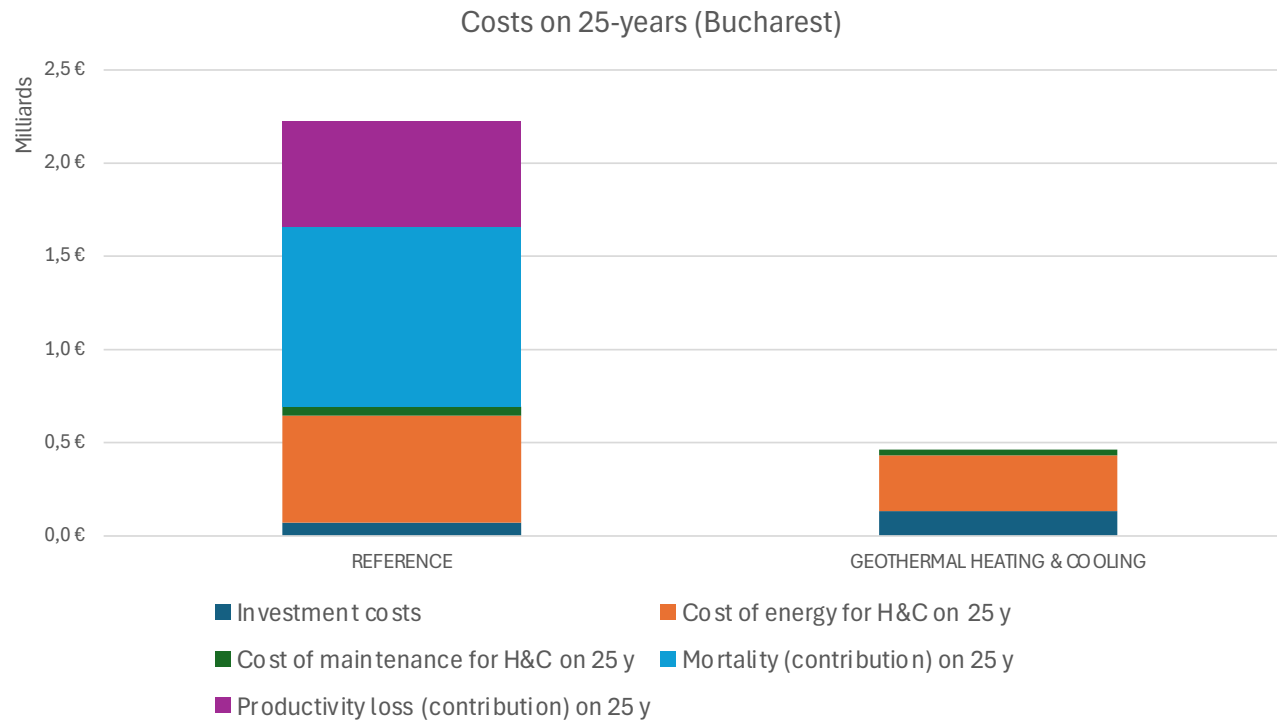
Mediterranean climate, high energy costs, average costs of geothermal installations.



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# 03-Results – Bucharest

Continental climate, low energy costs, low costs of geothermal installations.

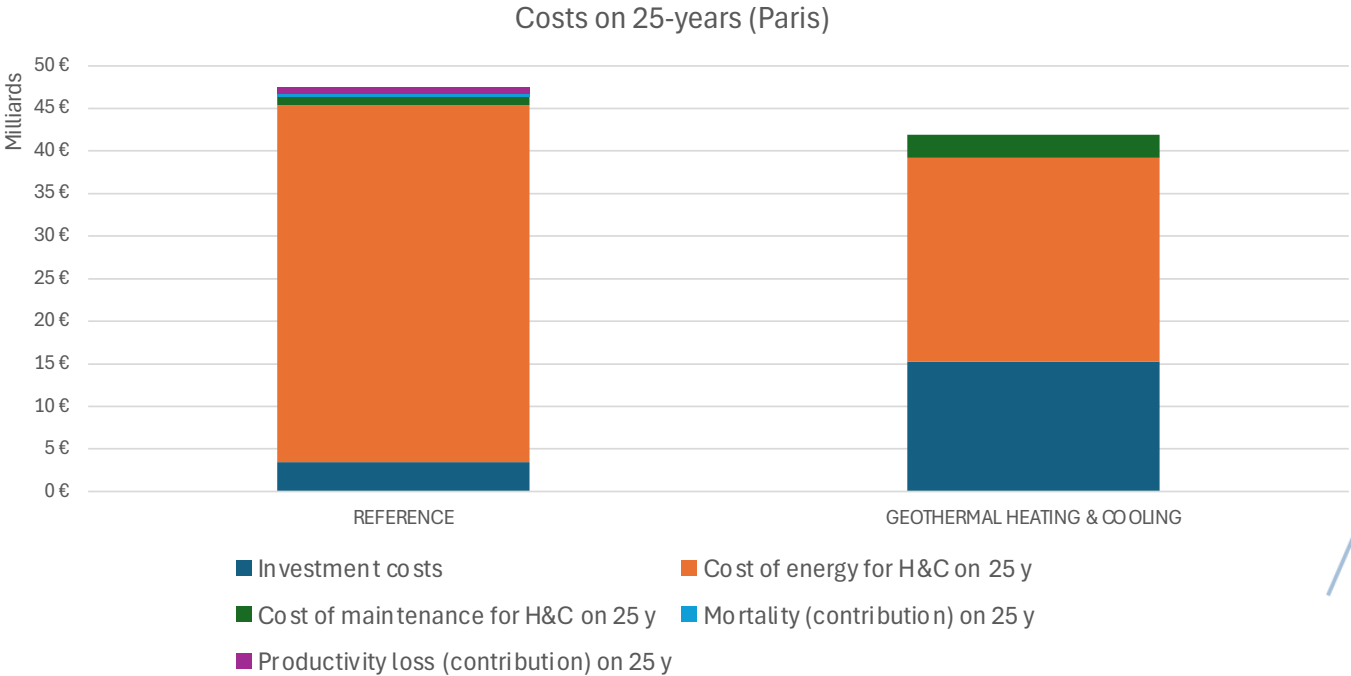


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# 03-Results – Paris

Ocean climate, average energy costs, high costs of geothermal installations.



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# 04-Conclusions – some precisions

- Unsurprisingly, investment costs for (efficient) geothermal installations are each time significantly higher than for the reference solution
- But each time, the annual savings (energy/maintenance) over 25 years are enough to make the installation profitable.
- In each of the capitals, the cost of “avoidable” externalities via the heat island is estimated between 1 and 1.5 billion euros over 25 years.



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# 04-Conclusions – recommendations

- Savings are expected on the economic\* and social\*\* levels :
  - \* profitability of work
  - \*\* mortality; (but direct and indirect costs of hospitalizations were not presented as part of this project)
  - \* & \*\* Reduction of energy poverty linked to cooling, particularly for vulnerable households
- Remove the brake on the investment barrier... for a solution that is already profitable over 25 years on a macro scale.
- Appropriation at the level of town planning as well as other city policies.
- Engagement of states to support and to contribute to the development of geothermal energy for heating and cooling.



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# Thank you

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