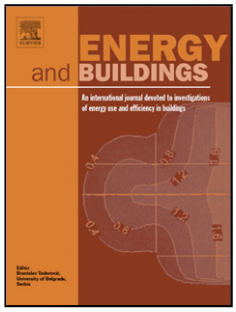

Title: A multi-objective design optimization strategy for vertical ground heat exchangers

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Highlights

- An optimal design strategy for vertical ground heat exchangers is proposed
- The method aims to minimize system upfront cost and thermodynamic irreversibility
- Two case studies are presented to validate the effectiveness of this strategy