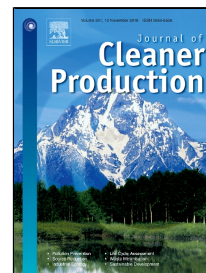


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Investment Strategy of Hydrothermal Geothermal Heating in China under Policy, Technology and Geology Uncertainties



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9
10 **Abstract:**

11 Geothermal energy has been considered as a new and promising source of clean heating in
12 some areas in China. However, huge initial investment cost and high uncertainties in policy, geology
13 and technology have been seriously hindering its development. Developing effective policies and
14 strategies to attract more investment for geothermal heating is a big challenge for the government.
15 Therefore, a real option model was proposed to find the optimal investment strategy for
16 hydrothermal geothermal heating projects with average well depth of 1350 meters under various
17 uncertainties in policy, technology and geological aspects. Meanwhile, an integrated Thermo-
18 Hydrological Coupling Model was developed to calculate the relationship between geological
19 conditions and the geothermal heating economics. Nine geological scenarios were proposed
20 considering different geothermal gradient and rock permeability and a sensitivity analysis was
21 conducted to investigate the effects of different supporting policies and mechanisms. Based on
22 obtained empirical results, it was concluded that, (i). The real option analysis framework is more
23 applicable in exploring investment strategy of hydrothermal heating projects than discounted cash
24 flow method; (ii). Higher subsidy level has an obvious impact on investment value but very limited
25 impact on timing; (iii). Technology progress and flexible subsidy phase-out mechanism can attract
26 the investment effectively.

27
28 **Key words:** Hydrothermal geothermal heating, uncertain geological conditions, real options,
29 supporting policies

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