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The potential for geothermal lithium in Italy

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Italy has never been a lithium (Li) producer, and the potential for "hard rock" deposits is moderate at best. On the other hand, the increasing demand for Li-based rechargeable batteries fostered new interest in this metal, and prompted the quest for alternative resources. The extraction of Li from geothermal brines ("geothermal lithium") is currently considered in several countries, including, in Europe, France, Germany, and UK (EGEC, 2020).

Italy has vast geothermal resources, and there is a potential for "geothermal lithium" as well. A preliminary survey of literature data pointed out several occurrences of fluids with Li contents up to hundreds of mg/L. Among high-enthalpy fluids, we point out those of Cesano, Mofete, and Latera. At Cesano, geothermal fluids contain about 350 mg/L lithium (Calamai et al., 1976). Early studies conducted in the past century (Pauwels et al., 1990) suggested the feasibility of lithium recovery from these fluids. Even higher contents (480 mg/L) occur in the deep reservoir at Mofete (Guglielminetti, 1986), whereas fluids in the shallow and intermediate reservoir in the same field contain 28 to 56 mg/L. Geothermal fluids at Latera have somewhat lower contents (max 13.5 mg/L; Gianelli and Scandiffio, 1989). Several low-enthalpy thermal waters in Emilia-Romagna, Sardinia, Sicily and Tuscany also show significant (> 1 mg/L) Li contents (max 96 mg/L at Salsomaggiore; Boschetti et al., 2011). There are no published Li data for high-enthalpy fluids at Larderello; however, evidence of Li-rich fluids was found in fluid inclusions in hydrothermal minerals (Cathelineau et al., 1994). Moreover, the shallow (ca. 3.5 km) granitoid body underlying the field contains a Li-rich (about 1,000 ppm) biotite (A. Dini, unpublished data); it has been estimated that such rock may contain as much as 500 g Li per cubic meter.

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