

## Resource Assessment of Lithium-Rich Brines, Germany

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### Extended Abstract

The high lithium demand forecasted for some high tech applications and batteries for electric and hybrid-electric vehicles, in particular, has sparked increased exploration for lithium. Lithium resources are of two main types: (i) brines pumped from aquifers; and (ii) hardrock deposits such as pegmatites [1]. The feasibility of recovering lithium economically from any deposit depends on the size of the deposit, its lithium content (referred to as “grade” for ores and “concentration” for brines), the content of other elements, and the processes that are used to remove the lithium-bearing material from the deposit and extract lithium from it [1]. In Germany, oil and gas field brines and deep-seated basin fluids, including waters of operating salt mines [2], are known to have elevated lithium concentrations. While the occurrence of lithium brines have been documented for some time, the genesis and possible use of these resources have not been considered in any detail.

The aim of this study is to gain a greater understanding of the resource potential of lithium-rich brines in Germany. Lithium brines cannot be considered industrial minerals because lithium occurs as ion in a dynamic fluid, rather than being chemically bonded in a solid. Although chemicals are produced from brines, brines have no relation to industrial mineral deposits. A preliminary mineral system analysis of the lithium brines, using the United States Geological Survey Preliminary Deposit Model for Lithium Brines [3], indicates that modifications to the US deposit model are needed for German brine occurrences. A revised deposit model should consider: (a) the importance of source rock mineralogy and the crystallographic siting of lithium; and (b) the role of basin fluids in leaching lithium source minerals. A preliminary assessment of resources and reserves of lithium brines, using the Canadian Best Practice Guidelines for Resource and Reserve Estimation for Lithium Brines [4], indicates that modifications to the Canadian guidelines are needed for German brine occurrences. In particular, revised guidelines should consider: (a) the availability of sufficient brine volumes, and (b) the identification of permeable formations [cf. 5]. Modifications to the Canadian guidelines are suggested because, if they are applied in their present format, it may result in overstating resources and reserves [cf. 5].

### References

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