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Future Lithium Supply: Towards a Robust Quantitative Assessment

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There has recently been considerable controversy over whether primary lithium (Li) sources will be able to supply the rapidly growing needs of the electric mobility transition. Unfortunately, existing assessments of future supply are hampered by a lack of consideration for the decision-making processes occurring at the level of individual mining projects and how these respond dynamically to changing market conditions. In the present contribution, we demonstrate how these processes, as well as associated uncertainties, can be incorporated into an assessment of the likely future evolution of global primary Li supply, including probable price trends.

Our method uses Monte-Carlo simulations to achieve this goal. A global database of existing Li mining projects (all development stages, including case histories) is used to build models that can estimate the likelihood of each project proceeding to the next development stage in any given year, depending on specific project characteristics such as location, deposit type, and ore grade, as well as market conditions. A series of stochastic simulations (1,000) are then run, in which projects are moved through the development pipeline according to these estimated likelihoods, year-by-year, up to 2050. New discoveries are also included to achieve realistic results over the relatively long timespan covered. A few simple demand scenarios (low, intermediate, high) are used as fixed inputs to these simulations to allow for easier interpretation.

Results show increasing divergence between demand and supply for demand scenarios incorporating more rapid growth. Some of this divergence may be offset by increasing recycling contributions to overall supply or through demand destruction as Li prices increase due to the divergence.