

# Lithium outlook to 2030 – A global perspective

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## INTRODUCTION

Demand for lithium for battery storage applications such as electric vehicles and off-grid energy storage systems is set to increase strongly from current levels until 2030 and beyond. Governments worldwide have set pathways for renewable energies as well as electric mobility while phasing out internal combustion engines<sup>1</sup>. As lithium possesses very specific electro-chemical properties, its substitution is not yet possible with current lithium-ion-battery technologies. Therefore, the mining industry as well as the connected downstream industry has to grow quite substantially until 2030 in order to meet the ambitious targets set by governments and industry. The biggest challenge for this will be the timely financing of projects in a sustainable way. In this paper, the current market situation of lithium is evaluated and possible new supply sources are put into a global context, including a supply/demand outlook to 2030.

### Economic sources of lithium

Lithium (from Greek: lithos) is a chemical element (i.e. alkali metal) with the atomic number three located in the second period and in the first main group of the periodic table of elements. Estimates for the Earth's crustal content are around  $6 \cdot 10^{-3}$  % by weight<sup>2</sup>. It is by no means a geologically scarce element. Economically, the most important sources of lithium are hardrock deposits and brine deposits. Pegmatite deposits currently account for more than 55% of global lithium supply. In addition, lithium is found in oilfield brines, geothermal brines, clays (i.e. hectorite) and lithium-containing minerals such as jadarite (i.e. type locality Serbia) or zinnwaldite (type locality Germany). There are about 200 minerals that contain lithium in concentrations  $> 0.002\%$   $\text{Li}_2\text{O}$ . About 25 of them contain lithium in concentrations  $> 2\%$   $\text{Li}_2\text{O}$ <sup>3</sup> but only a few of them are economically viable. Geothermal brines appear to show some new potential, mostly in the US and Europe (i.e. Germany and France). Important pegmatite deposits are found in Western Australia, Canada and Sub-Saharan Africa (i.e. in Zimbabwe, Democratic Republic of Congo, Mozambique and Namibia)<sup>2</sup>.

### Current Supply

In 2020 global mine output was 82.000 t Li-cont. Australia was by far the largest producer with 39.700 t Li-cont. and a market share of 48,3%. Second largest producer was Chile with 21.500 t Li-cont. and a market share of 26,2%<sup>4</sup>. Those two countries supplied close to 2/3<sup>rd</sup> of global lithium supply in 2020. Even though other countries have some high potential for the future, these two countries will still be the dominant suppliers in the mid- to long-term. Secondary supply from recycling of lithium-ion-batteries or other applications of lithium does not yet play a vital role in global supply. This may and will change towards 2030 and beyond as regulatory frameworks are put into place. This recycling industry is currently developing in many countries in order to deal with upcoming recycling targets.

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<sup>1</sup> <https://www.politico.eu/article/european-parliament-votes-to-ban-combustion-engine-cars-from-2035/>

<sup>2</sup> Schmidt, M. (2017). Rohstoffrisikobewertung – Lithium. – DERA Rohstoffinformationen 33: Berlin. 134 pp.

<sup>3</sup> Garret, D.E. (2004). Handbook Of Lithium And Natural Calcium Chloride: Their Deposits, Processing, Uses And Properties. 467 pp.

<sup>4</sup> Jaskula B.W. (2021). USGS-Lithium – Mineral Commodity Summaries. 2 pp.

## Demand

By far the most important use of lithium is in the field of rechargeable batteries. In 2020, this area accounted for 71% of total demand compared to 37% in 2015<sup>2,4</sup>. Lithium is an essential component in modern lithium-ion-batteries since it has the highest electrochemical potential of all metals and the highest specific capacity. The second most important application of lithium is in the field of glass and ceramics. Cumulatively, this area accounted for 14% of demand in 2020. These two main applications currently account for 85% of total global demand<sup>3</sup>. Other applications include lubricating greases, continuous casting mould flux powders, polymers, air treatment and other minor applications. Future demand is set to increase dramatically for lithium-ion-batteries. In 2030 this application may account for more than 90% of total demand.

## Price Development

In general, lithium is traded as either lithium-bearing mineral concentrates containing usually up to 6% Li<sub>2</sub>O or lithium carbonate and lithium hydroxide as intermediate products<sup>1</sup>. Lithium prices have been very volatile in the past 24 months. As a result, prices surged to record levels for both lithium carbonate and lithium hydroxide in early 2022. Currently all lithium products are at all-time highs. Spodumene concentrate prices are currently at roughly 6.000 \$US/t. Lithium carbonate prices are currently at roughly 71.000 \$US/t. Lithium hydroxide prices increased to more than 72.000 \$US/t<sup>5</sup>.

## Summary and Outlook

The lithium market has been highly volatile in the past three years. The market expects very high annual growth rates for demand in the coming years. We assume, depending on internal scenarios, that the overall demand for lithium will increase by a factor of 4 – 6 by 2030. This demand outlook will put enormous pressure on the mining industry which will have to provide much larger quantities in the near future. This has to happen in a more sustainable way. Alternative sources such as geothermal brines may play an important role in the future. Also, recycling will gain in importance as a supply source in the future. The mining industry is currently underinvested and a large supply gap is expected towards 2030.



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Between 2009 and 2012, Michael worked for the Martin Luther University Halle – Wittenberg where he worked on CCS technology. He also worked for different Junior Mining Companies (mostly Silver and Gold but also Antimony). Since October 2012, he works in risk analysis for different commodities including Antimony, PGMs, Lithium and Boron. In this position, he is also consultant to the German Industry in commodity related issues. He is the designated lithium expert of DERA.

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<sup>5</sup> BGR – Bundesanstalt für Geowissenschaften und Rohstoffe. (2022). Fachinformationssystem Rohstoffe – unveröff.