

The crucial role of pump selection in EV battery manufacturing



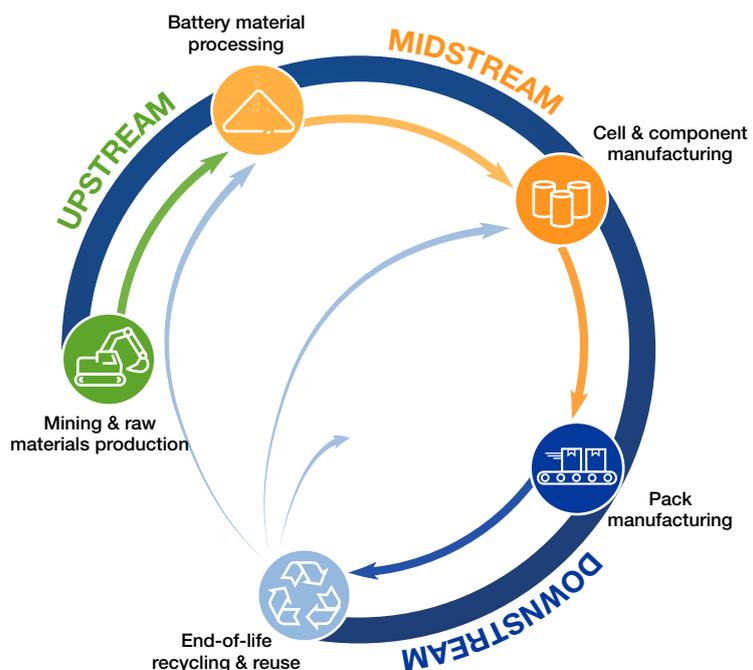
The electric vehicle (EV) market is experiencing unprecedented growth, driven by the global shift towards sustainable energy and transportation. At the heart of this revolution is the EV battery, a component that has become synonymous with innovation, efficiency, and environmental stewardship. The manufacturing process of these batteries is complex and multifaceted, with stringent requirements for precision, reliability, and sustainability. This whitepaper underscores the critical importance of selecting the right pump for each stage of the EV battery’s lifecycle: raw material extraction and processed compound, battery production, and battery recycling.

01 Upstream (from raw materials to processed lithium compound)

The first stage in the lifecycle of an EV battery involves the extraction and processing of raw materials, such as lithium, nickel, and cobalt. The ore mineral process requires robust and efficient pumping systems capable of handling abrasive slurries and aggressive chemicals under harsh conditions. The right pump not only optimizes the extraction process but also minimizes the environmental impact by reducing energy consumption, reducing water demand and preventing leaks or spills that could contaminate the ecosystem.

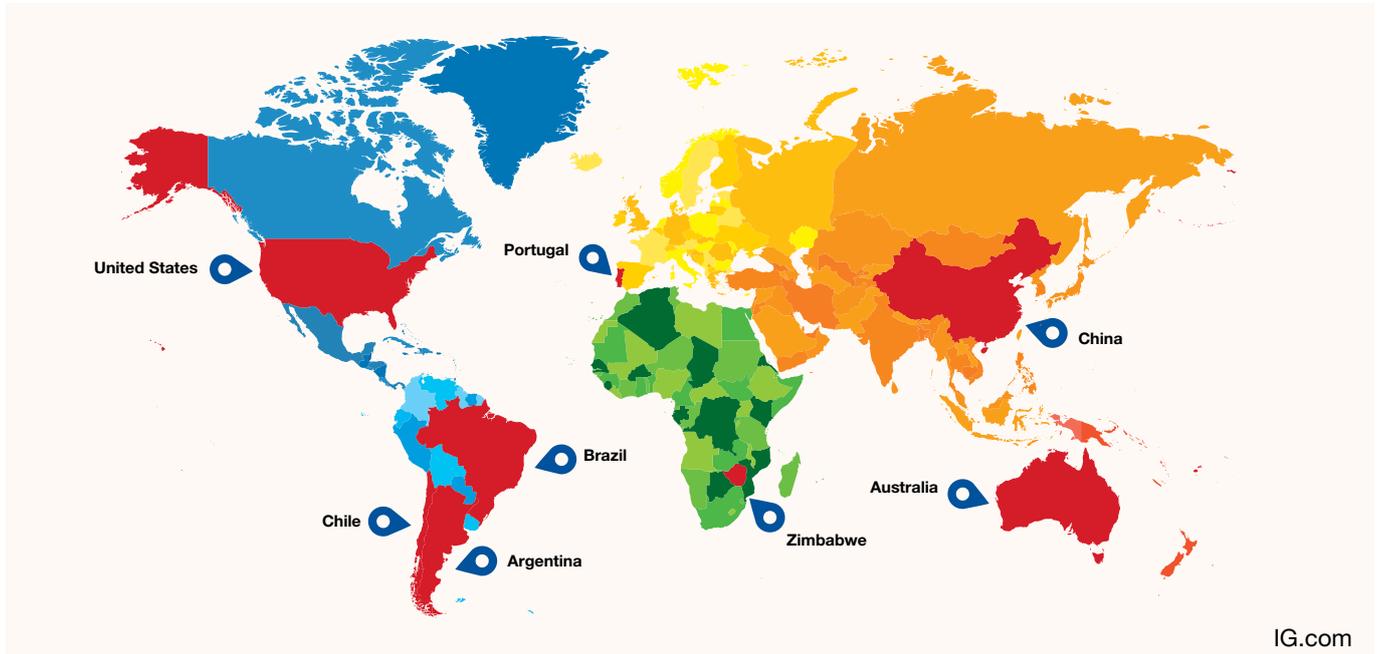
Key considerations:

- **Material Compatibility:** Pumps must be constructed with materials that can withstand corrosive and abrasive liquids.
- **Energy Efficiency:** High-efficiency liquids reduce the overall carbon footprint of mineral processing operations.
- **Reliability and Durability:** Pumps must deliver consistent performance and have a long service life to minimize downtime.
- **Water Efficiency:** Pumps with high density capabilities to reduce water requirements in the extraction of slurries.

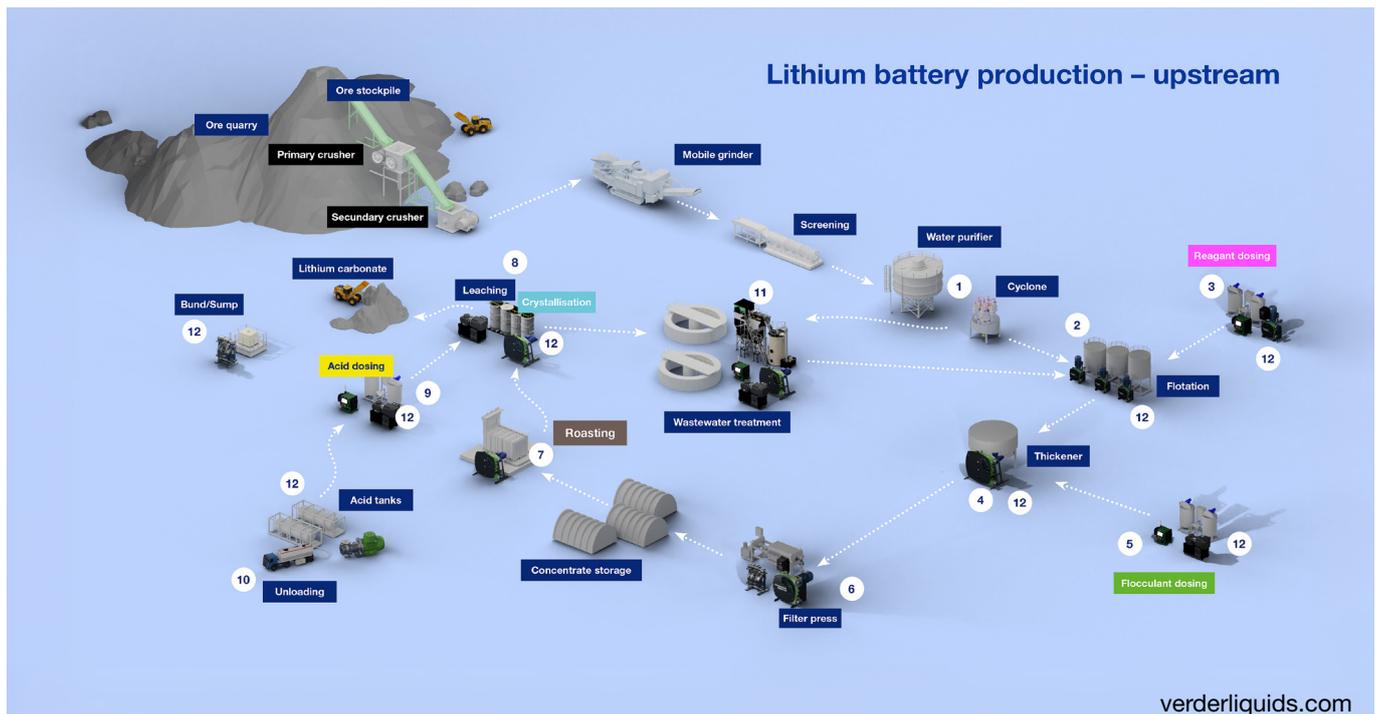


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Top 8 lithium producing countries



In general, Peristaltic Pumps and Double Diaphragm pumps are most suited to handle these harsh conditions best. Of course, depending on specific process parameters, slurry density, corrosive liquid properties, transfer volume, dosing accuracy, available budget, etc. other considerations can be made.



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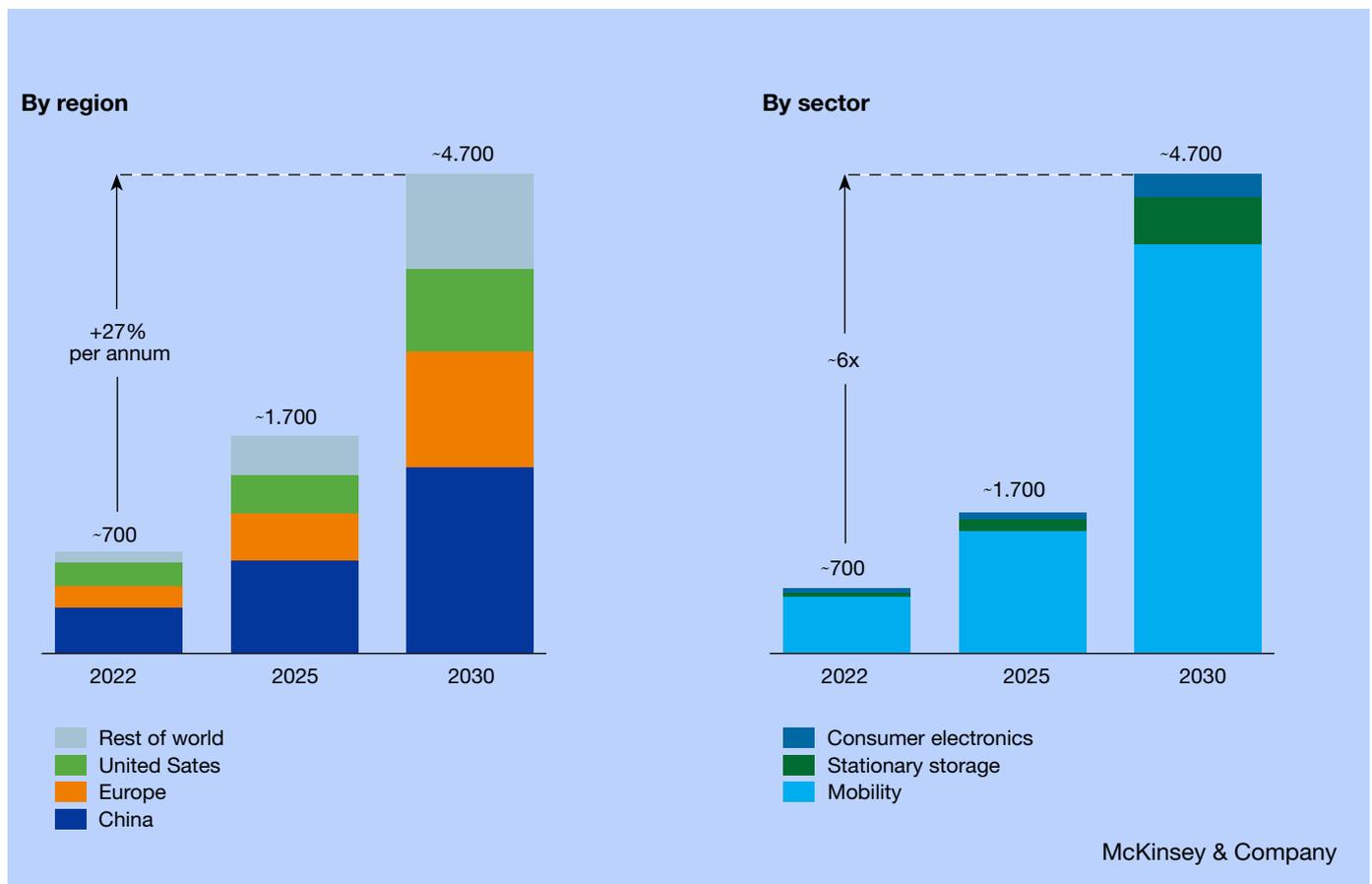
02 Middle stream (battery production)

The demand for batteries are constantly increasing, which means while being aware of manufacturing costs the decisive factor for battery manufacturers is battery efficiency. The quality of battery material determine the energy density storage capacity within the battery, and consequently influence the range of the electric car or device that needs power. The correct pump material ensures the battery material rheology is maintained. No liquid shear and no metal contact is vital to determine the quality of the battery during the manufacturing process. From anode and cathode coating to electrolyte filling each step requires precise control and abrasive resistant low to no shear pumps to produce the best energy dense battery possible.

Key considerations:

- **Precision and Control:** Pumps must provide precise flow rates while maintaining the product rheology.
- **Clean and Contamination-Free Operation:** Pump material must avoid any metal parts to avoid contamination of undesired energy charge to battery material.
- **Compliance with Safety Standards:** Pumps should adhere to the highest industry safety standards to protect workers and the environment

Li-ion battery cell demand is expected to grow by about 27% annually to reach around 4.700 GWh by 2030.



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03 Downstream (usage of the battery & battery recycling)

Managing the life cycle of electric vehicle (EV) batteries at their end of life poses both difficulties and possibilities. The recycling method shares many similarities with the extraction of lithium from used batteries compared to procuring lithium hydroxide from spodumene ore. After the initial grinding and separating plastics from the spent batteries, the remaining battery minerals are processed through chemical leaching. This process aims to transform the mineral components of the slurry into a liquid form of metal. Flotation techniques, employing specific reagents and adjusting pH levels, facilitate the segregation of different materials, enabling the extraction of lithium and its separation from other substances found in batteries such as copper, cobalt, graphite, magnesium, and nickel. Recycling batteries is crucial for reclaiming precious resources and mitigating the environmental toll of discarded batteries. Throughout the recycling operation, pumps must precisely handle and administer reagents while being resistant to aggressive chemicals, including Hydrofluoric Acid and Sulfuric Acid, with concentrations as low as 30% at temperatures reaching 50 degrees Celsius.

Key considerations:

- **Chemical Compatibility:** The choice of pump material must be suitable to withstand the harsh and corrosive acids in the chemical leaching process.
- **Versatility:** Lithium and other battery metals will be re-used to manufacture batteries, or used in different industries such as ceramics and glass manufacturing. High density, accurate and chemical compatible pumps will be e-purposed in new applications.
- **Compliance with Safety Standards:** Pumps should adhere to industry safety standards to protect workers and the environment. It is essential to avoid any risk on chemical exposure to the environment and working staff.



Conclusion

In the booming EV battery industry, the selection of a reliable and expert pump supplier is not just an operational decision; it is a strategic one. Verder Liquids stands as a trusted partner in this critical industry, offering a range of pumping solutions that meet the rigorous demands of each stage in the EV battery's lifecycle.

Verder Liquids' pumps are designed, engineered and applied to industry leading technology standards to ensure material compatibility, energy efficiency, and operational safety. With a commitment to innovation and excellence, Verder Liquids provides pumps that excel in precision, control, and durability. Their extensive expertise and proactive service ensure that their pumping solutions are not only effective but also contribute to the sustainability and success of the EV battery manufacturing process.

The future of mobility is electric, and the foundation of this future is built on the reliability and effectiveness of the pumps used throughout the process!



More than 60 years of experience in professional pumping applications make VERDER the pump manufacturer of choice for customers from many industries on all continents. VERDER offers you process understanding, the technological expertise and the market insight to develop pumping solutions which rank among the best in the world. This is how we enable your progress.

