AquaRock | Research

May 2026

COMMODITY RESEARCH

New Growth Drivers for Zirconium Demand: Nuclear Power and Solid-State Batteries

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Key takeaways:

- China real estate starts function as a leading indicator for zircon sand prices with a 12-month time lag and a strong correlation coefficient.
- China's real estate market is bottoming out, and this will provide a floor for zircon sand prices.
- A boom in nuclear power from 2026 to 2030 will drive the demand for nuclear-grade zirconium sponge and zircon sand.
- Global demand for nuclear-grade zirconium sponge will reach 8,139 tonnes by 2030, with a 4.6% CAGR from 2025.
- Under our optimistic and conservative scenarios, the nuclear sector will require 40,693 and 29,299 tonnes of zircon sand by 2030, respectively
- Under our optimistic scenario, solid-state battery installations are projected to reach 300 GWh, with oxide-based variants accounting for 135 GWh.
- The expansion of oxide-based solid-state batteries will demand an estimated 59,834 tonnes of zircon sand.
- Oxide-based solid-state battery electrolytes in EVs will drive a 25,361% growth in zircon sand demand by 2030 compared to 2025. We expect that the rise of oxide solid-state batteries will increase the demand elasticity of zircon sand.
- The total demand for zircon sand in the nuclear power and EV sectors will reach approximately 100,000 tonnes under our optimistic scenario by 2030.
- Looking beyond the scope of this report, oxide-based solid-state batteries present substantial growth potential for zircon sand demand in consumer electronics, drones, and robotics.

Analyst comment

Global annual production of zircon sand is hovering around 1 to 1.1 million tonnes. This supply is dominated by Australia and South Africa, which together account for over 70% of the world's output, making the market sensitive to localised disruptions. On the demand side, China stands as the primary buyer, consuming nearly 50% of the annual global supply. The mines in major producing regions such as Australia are facing depletion, and the global supply of zircon sand is expected to decline by 11%. Meanwhile, demand is expected to grow in fields such as nuclear power and solid-state batteries, leading to a widening supply-demand gap. Our research forecasts that solid-state batteries and nuclear power could generate 100,000 tonnes of additional zircon sand demand by 2030, equivalent to 10% of 2025 global production, and this is expected to push the zircon sand price centre higher.

100,000 t

Zircon sand demand in nuclear power and solid-state batteries by 2030

Real estate bottoming out is expected to support zircon sand prices

Ceramics and sanitary ware account for over 50% of global zircon sand demand. Driven by its high refractive index, zircon sand is utilised as a whitening opacifier in tile glazing. Therefore, real estate starts function as the leading indicator, driving the price trajectory of zircon sand. In this research, we conduct a correlation analysis between housing starts in the Chinese real estate market and zircon sand prices.

We found that real estate market changes affect zircon sand prices with a clear time lag. The impact starts to show at month 7, and is fully absorbed into the price by month 12 with a strong correlation coefficient of 0.8.

The Chinese real estate market saw a post-pandemic boom in 2020. This boom, along with supply disruptions, pushed zircon sand prices to a high peak by 2021. After that, the market entered a downturn around 2021, and we observed that the impact of this slowdown hit zircon sand pricing about 12 months later.

Since 2024, China's housing starts (YoY) have formed a solid floor around -25%, showing a clear sign of stabilizing. However, due to a 12-month time lag in the ceramic supply chain, this stabilising signal has not yet hit zircon sand prices (YoY). Currently, zircon sand price growth is still shaking at a low level of -15%. We expect that as these early housing projects finish, robust support for prices will start to show in the second half of 2026.

12 Month

China real estate starts lead zircon sand prices

-37.5%

Zircon sand price decrease since 2022

Nuclear power expansion will push zircon sand demand to a higher level

The physical and chemical properties of zirconium fully meet the strict requirements for nuclear fuel cladding. In addition, zirconium has a very low neutron absorption, which can effectively reduce the neutron loss in fuel rods and improve thermal efficiency. Therefore, zirconium alloys are widely used as materials for reactor claddings and various internal structures, holding an irreplaceable value in the nuclear industry.

After experiencing years of stagnant growth, the global nuclear industry is entering a major boom starting in 2026. According to data from the International Atomic Energy Agency (IAEA) and World Nuclear Association (WNA), there are 413 operational reactors by the end of 2025 with a total capacity of 380.2 GW. There are about 80 reactors under construction globally, and an estimated 85 GW of capacity will be connected to the grid over the next five years. We expect a window for the boom in nuclear power from 2026 to 2030, which will drive the demand for nuclear-grade zirconium sponge and zircon sand.

An initial nuclear installation needs about 30 tonnes of zirconium alloys per GW, and a nuclear plant replaces about one-third of its fuel rods every year. Our model forecasts that global demand for nuclear-grade zirconium sponge will reach 8,139 tonnes by 2030, with a 4.6% CAGR from 2025. This requires 40,693 tonnes of zircon sand under our optimistic scenario and 29,299 tonnes under our conservative scenario. Detailed demand projections for nuclear-grade sponge zirconium and zircon sand are provided in the appendix.

China is leading this new nuclear expansion with 39 reactors under construction, and we expect its demand for zircon sand to increase significantly. In terms of price, once the housing market finishes bottoming out and stabilises, this rising demand from the nuclear sector will drive zircon sand prices up.

80

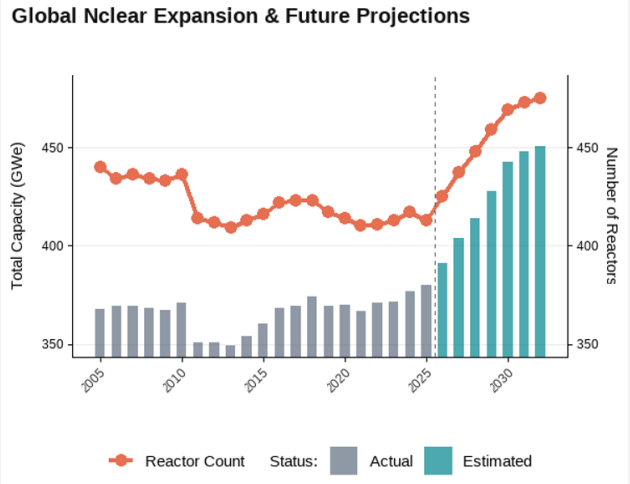
Reactors under construction globally

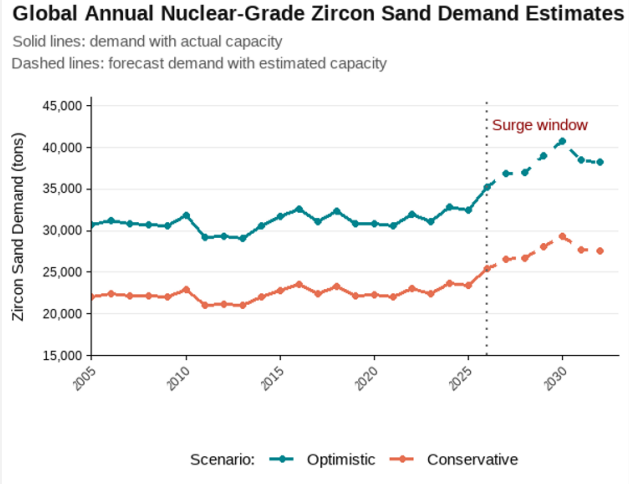
40,693 t

Demand for zircon sand in nuclear sector by 2030

4.6%

Nuclear-grade zirconium sponge demand CAGR from 2025 to 2030





The rise of oxide solid-state batteries creates new zircon sand demand

Solid-state batteries (SSBs) use solid electrolytes instead of liquid ones, which eliminates fire and leak risks. By utilising higher-performance electrodes, SSBs offer much higher energy density, significantly extending the driving range of electric vehicles and other devices. Solid-state batteries are categorised into three distinct pathways according to the electrolyte type: polymer, sulfide, and oxide. In the oxide category, Lithium Lanthanum Zirconium Oxide (LLZO) is generally considered the most promising core material with optimal comprehensive properties.

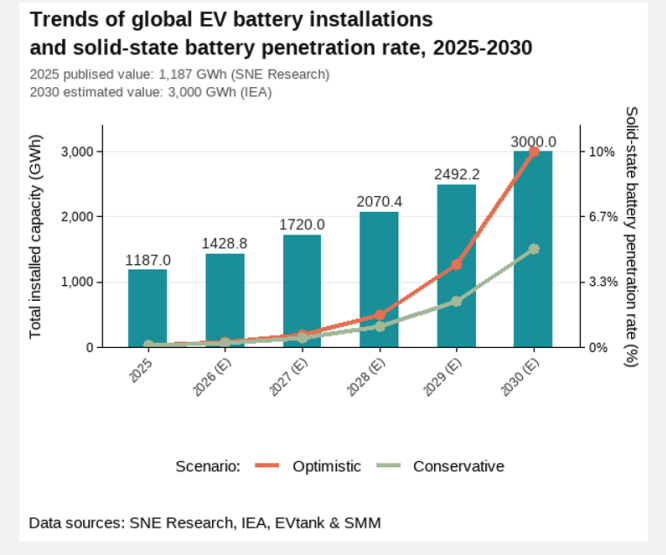
With a 35%:45%:25% pre-sintering mass ratio of lithium hydroxide, lanthanum oxide, and zirconia, the widespread commercialisation of LLZO in solid-state batteries will unlock a new market for zirconia and increase the demand for zircon sand. The International Energy Agency (IEA) estimates that global EV battery installations will reach 3,000 GWh by 2030. Under our optimistic scenario, our model forecasts that oxide-based solid-state battery installations will hit 135 GWh. To support this growth, each GWh of solid-state battery requires 1,141 tonnes of LLZO material, needing 285 tonnes of zirconia for sintering. Given the conversion ratio of approximately 1:1.55 from zirconia to zircon sand, this will drive 59,834 tonnes of zircon sand demand by 2030, surging by 25,361% compared to 2025. Under our conservative scenario, solid-state batteries will need 29,917 tonnes of zircon sand by 2030. We expect that the rise of oxide solid-state batteries will enhance the structural demand elasticity of zircon sand.

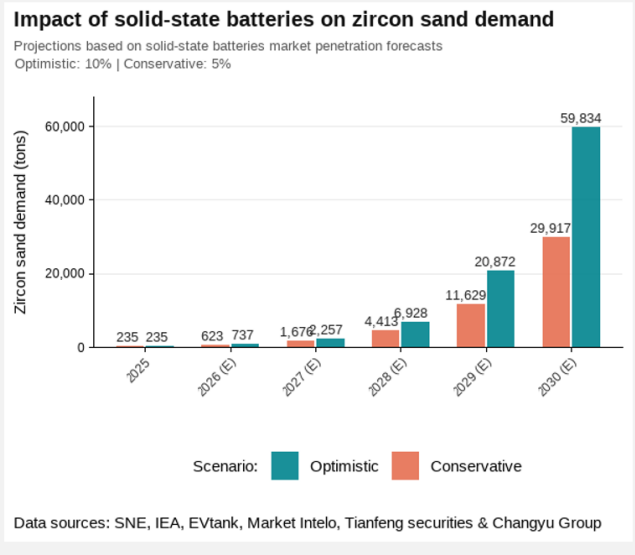
It is worth noting that our analysis is confined to the electrolytes in solid-state batteries. Incorporating electrode additives would further amplify the battery demand for zirconium. Additionally, this forecast is limited to electric vehicle (EV) applications; the aggregate demand for zircon sand is projected to elevate substantially should the scope of this study expand to include consumer electronics, drones, and robotics.

135Gwh
Installations of oxide-based SSBs by 2030

59,834 t
Demand for zircon sand in SSBs by 2030

25,261%
Zircon sand demand growth in SSBs, 2025 - 2030





Appendix

Appendix.1: Modelled demand projections for nuclear-grade sponge zirconium and zircon sand

	2024	2025	2026 (E)	2027 (E)	2028 (E)	2029 (E)	2030 (E)
Global operational nuclear power capacity (GW)	377.01	380.20	390.95	403.89	413.86	427.51	442.71
Global annual added nuclear capacity (GW)	5.47	3.19	10.75	12.94	9.97	13.65	15.20
Incremental demand for nuclear-grade zirconium sponge(tons)	273.50	159.50	537.50	647.00	498.50	682.50	760.00
Replacement demand for nuclear-grade zirconium sponge (tons)	6,283.50	6,336.67	6,515.83	6,731.50	6,897.67	7,125.17	7,378.50
Total demand for nuclear-grade zirconium sponge (tons)	6,557.00	6,496.17	7,053.33	7,378.50	7,396.17	7,807.67	8,138.50
Total demand for zircon sand - conservative (tons)	23,605.20	23,386.20	25,392.00	26,562.60	26,626.20	28,107.60	29,298.60
Total demand for zircon sand - optimistic (tons)	32,785.00	32,480.83	35,266.67	36,892.50	36,980.83	39,038.33	40,692.50

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