Spodumene refining – decarbonisation opportunities beyond electric vehicles

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Lithium hydroxide monohydrate is a key critical material used to power the battery electric vehicle revolution. The process to extract lithium hydroxide monohydrate from spodumene ore produces a large volume of aluminosilicate by-product (also known as delithiated beta spodumene, or DBS). On average, between 7-10 MT of aluminosilicate material is generated for every ton of lithium hydroxide monohydrate produced. Chinese lithium refineries sell this by-product as a mineral addition which is interground with clinker for local cement production with addition rates varying between 3-5%.

Given Tianqi Lithium Kwinana's commitment to circular economy best practices, considerable research has been undertaken over many years to investigate how DBS pozzolanic properties can be beneficially used in cement and concrete applications here in Australia. Extensive research work by Building, Construction and Research Consultancy (BCRC), the Australasian Pozzolan Association (APozA) and national cement laboratories resulted in the publication of a new Australian Standard AS3582.4:2022 for manufactured pozzolans, highlighting the beneficial use of DBS as a supplementary cementitious material with recommended replacement ratios between 20-40%.

Cement manufacturers have been increasingly focussing their efforts on CO_2 emissions reduction with a concerted effort to decarbonise the industry. DBS provides an excellent opportunity to beneficially utilise a locally manufactured SCM product to offset the reducing availability of fly ash quantities (from coal power plants) and blast furnace slag (an imported raw material).

This presentation will feature Tianqi Lithium Kwinana Plant's research initiatives to understand the Tianqi Aluminosilicate (TAS) pozzolanic properties and pathways explored to take advantage of its pozzolanic properties. A summary of TAS technical properties is also presented.