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30 April 2025

Alison Roberts
Commissioner
Productivity Commission
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Email: circular.economy@pc.gov.au

Dear Commissioner,

RE: AUSTRALIA'S CIRCULAR ECONOMY: UNLOCKING THE OPPORTUNITIES

Thank you for the opportunity to provide a submission on the Productivity Commission's (**PC**) publication "Australia's circular economy: Unlocking the opportunities Interim report" (**Interim Report**).

Albemarle is actively pursuing circular economy initiatives of relevance to the inquiry and provides this submission to highlight our experiences progressing these opportunities. This will focus primarily on current experiences with market development and commercialisation of delithiated beta-spodumene (**DBS**), a coproduct of Albemarle's Kemerton Lithium Plant (**Kemerton**). An overview of Albemarle, Kemerton and DBS are provided below for context.

This submission is of most relevance to Chapter 7: Mining of the Interim Report as well as some aspects of Chapter 4: The Built Environment.

1. Albemarle in Australia and the Kemerton Lithium Plant

Headquartered in Charlotte, North Carolina, Albemarle Corporation is one of the world's largest producers of lithium and bromine products. It employs approximately 9,000 people globally and serves customers in approximately 70 countries.

In Australia, Albemarle's activities occur wholly in Western Australia (**WA**) – a globally significant jurisdiction for lithium. These WA-based interests are:

- Ownership (100%) and operation of the Kemerton, the largest lithium hydroxide refinery outside of China;
- A 49% shareholding in the Greenbushes Lithium Mine (**Greenbushes**) operated by Talison Lithium – the source of the spodumene concentrate processed at Kemerton;

- A 50% joint venture with Mineral Resources Limited in the Wodgina Lithium Mine (operated by Mineral Resources Limited); and
- Multiple exploration licences and interests across the WA regions of the Pilbara, South West and Goldfields.

Albemarle's workforce in Australia is predominantly based around Kemerton, located approximately 17km from the south-west WA city, Bunbury. It is located within the Kemerton Strategic Industrial Area (**KSIA**) and employs approximately 450 people. Construction of Kemerton began in 2019 shortly after Tianqi Lithium Corporation commenced construction of Australia's first lithium processing plant at Kwinana.

Commissioning of Kemerton commenced in 2022. Two of the five processing trains approved through both WA Government and the Commonwealth Government approval processes were built. Each processing train has a design capacity of up to 25,000 tonnes per annum of lithium hydroxide monohydrate (**LHM**, $LiOH.H_2O$), a precursor chemical for batteries and an essential element for electric vehicles and the global energy transition. Of the two constructed processing trains, one was placed into care and maintenance in August 2024 as a result of current low global lithium prices.

The lithium feedstock for Kemerton is spodumene concentrate (**SC 6.0**) sourced from Greenbushes, less than 100km away by road. Lithium concentrates have been produced at Greenbushes since 1983 and the mine is world renowned as the highest grade lithium hard-rock (spodumene) mine in the world. The SC 6.0 is produced from freshly mined lithium-rich spodumene, which is sorted, crushed and concentrated approximately three-fold at Greenbushes to produce SC 6.0 containing 6% (w/w) lithia (Li_2O). The SC 6.0 is then trucked to Kemerton with each operating processing train requiring approximately 250,000 tonnes of SC 6.0 per annum to produce LHM at design capacity.

At Kemerton, for each 10 tonnes of SC 6.0 processed, approximately 1 tonne of LHM is produced (at ~99.5% purity), plus nearly 2 tonnes of sodium sulphate anhydrous (**SSA**) and 11 tonnes of delithiated beta spodumene (**DBS**) (Figure 1). All three of these are considered "products" at Kemerton, with all three having uses and markets. The LHM production drives the economics of Kemerton with overall throughput at the plant driven by market demand for LHM. By volume, however, by far the largest amount of product made is DBS.

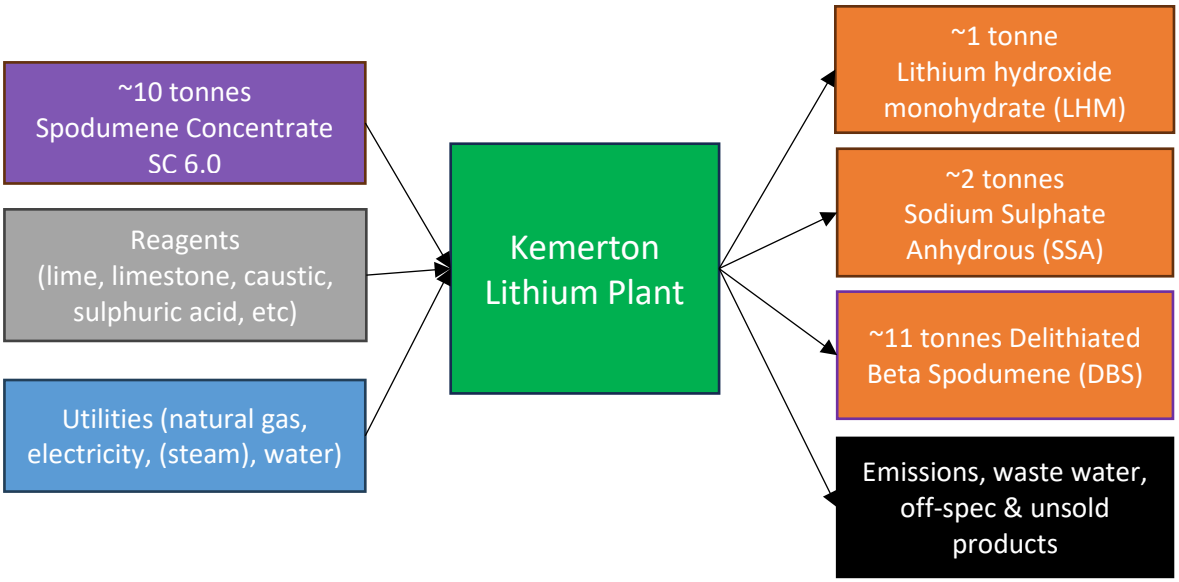


Figure 1 Simplified Overview of Kemerton Lithium Plant Inputs and Outputs (Products in Orange)

Kemerton is typical of mineral downstream processing where the element or compound of interest (in this case lithium) does not naturally exist in a pure form. This means large amounts of the source mineral must be extracted to obtain the desired amount of the element or compound of interest, with most of that source mineral not ending up in the primary product (in this case LHM). Instead, a large volume of other products (coproducts) are produced which must either find a use and market or be disposed (ie: it becomes "waste").

With regards to SSA, it has a long history of industrial uses and well established markets globally. This has made commercialisation of Kemerton's SSA product to both domestic and international customers relatively easy, with sales of all on-spec SSA production from Kemerton now occurring.

In contrast, DBS is a relatively new product, not previously produced in Australia prior to the commencement of lithium processing in WA in 2022. Albemarle's experience with DBS market development and commercialisation contrasts sharply with the SSA opportunity. A key barrier, as discussed in response to the PC Information Requests below, is the treatment or perception of DBS by some as a "waste" rather than primary production of a valuable natural resource that should be put to its highest and best use.

2. Delithiated Beta Spodumene (DBS)

Kemerton's DBS product is crushed **spodumene** rock, freshly mined from the Greenbushes that has been processed through a kiln (to convert the lithium crystalline structure in the spodumene from alpha-spodumene to **beta**-spodumene to make it susceptible to lithium leaching), and then had the lithium removed (**delithiated**) through the acid-leaching circuit, followed by neutralisation to produce a pH-neutral material – hence why it is called "delithiated beta spodumene".

Its composition (consistent with its source from spodumene) is mostly aluminosilicates with quartz and feldspar, water and gypsum (calcium sulphate) (Table 1 below). DBS is similar in

mineral composition to freshly quarried sand but with a higher gypsum and water content and a finer overall particle size distribution as the rock has been crushed as part of the lithium extraction process to increase lithium recovery. Additionally, DBS is a natural pozzolan (ie: it cements) and is classified as a manufactured pozzolan under Australian Standard (**AS**) 3582.4:2022, Supplementary cementitious materials Part 4: Pozzolans – Manufactured.

Table 1 Characteristics of DBS

Components

Chemical name	CAS-No.	Concentration (% w/w)
Aluminosilicates, zeolites	1318-02-1	>= 30 -< 60
water	7732-18-5	>= 10 -<= 30
calcium sulphate dihydrate	10101-41-4	< 20
Quartz (SiO2)	14808-60-7	< 10
Feldspar-group minerals	68476-25-5	< 10
calcium carbonate	1317-65-3	< 10

DBS' classification, under the Globally Harmonized System of Classification and Labelling of Chemicals (**GHS**), is "Not a hazardous substance or mixture". A copy of the product Safety Data Sheet for DBS is provided as an attachment.

The properties of DBS mean its key uses and potential markets are predominantly in the construction and infrastructure sectors of the economy (built environment) focused on:

- Use as an alternative aggregate to freshly quarried (virgin) sand in applications where either smaller particle size is advantageous (such as blinding cement) and/or blended with freshly quarried (virgin) or recycled sand to improve particle size distribution and reduce the demand for new freshly quarried sand (such as fill or aggregates in other bound, non-structural applications).
- Use as a supplementary cementitious material (SCM) in the cement industry to take advantage of its natural pozzolanic properties as an alternative to current commonly used pozzolans.

3. Reform direction and Information request 4.1, Enabling fit-for-purpose use of recycled materials in public projects

The PC is considering ways governments can reduce unnecessary regulatory barriers to using fit-for-purpose recycled inputs in public infrastructure projects (such as roads). Options could include modifying or harmonising existing standards and specifications and developing new standards.

The PC is seeking information on:
• prescriptive versus performance-based standards:
– specific examples where prescriptive standards or specifications for infrastructure construction significantly inhibit the use of recycled materials
– what other benefits or objectives these prescriptive standards are intended to achieve (for example, public safety, or to enable clarity for smaller businesses)
– ways that various levels of governments could facilitate greater use of performance-based standards
– challenges, costs and benefits, and implementation issues that need to be considered if moving from prescriptive to performance-based standards (for example, monitoring and enforcement)

• harmonisation of standards:
– key areas where there is scope to harmonise standards and specifications across states or territories and increase the use of recycled materials
– specific implications (costs, benefits, risks) of harmonisation (for example, due to lack of flexibility to reflect local conditions), and whether or how they could be overcome.

Albemarle provides the following examples related to DBS:

a) Use as a manufactured pozzolan in cement

DBS is classified as a manufactured pozzolan under "Australian Standard (AS) 3582.4:2022, Supplementary cementitious materials Part 4: Pozzolans – Manufactured." Part 4 of the standard was published in 2022 in line with the emergence of a manufactured pozzolans industry in Australia. However, for industry to be able to make and sell cement that can utilise the demonstrated cementitious properties of DBS (a "Manufactured Pozzolan"), the associated "AS 3972 General purpose and blended cements" first requires amendment as it does not (yet) allow for the use of Manufactured Pozzolans. AS 3972 has been proposed for revision for some time but it is unclear when this will occur.

b) Use as fill material

In WA, "clean fill" is defined as:

> "raw excavated natural material such as clay, gravel, sand, soil or rock fines that:
> (a) has been excavated or removed from the earth in areas that have not been subject to potentially contaminating land uses including industrial, commercial, ***mining*** or intensive agricultural activities; and
> ***(b) has not been processed except for the purposes of:***
> ***i. achieving desired particle size distribution; and/or***
> ***ii. removing naturally occurring organic materials such as roots;*** and
> (c) does not contain any acid sulfate soil; and
> (d) does not contain any other type of waste."[1]

DBS does not meet the definition of clean fill as it meets neither clause (a) nor (b) of above (as indicated in bold).

In most fill applications in WA "uncontaminated fill" can be used in lieu of "clean fill". "Uncontaminated fill" is defined in WA as:

> *"(a) inert waste type 1 (excluding asphalt and biosolids) that meets the requirements set out in Table 6, as determined by relevant sampling and testing carried out in accordance with the requirements set out in Table 7; and*
> *(b) neutralised acid sulfate soil that meets the requirements for relevant metals, metalloids and sulfate set out in Table 6, as determined by relevant sampling and testing carried out in accordance with the requirements of Table 7."*[2]

DBS is also not "uncontaminated fill" as it is a product not a waste (so does not meet (a)) and it is sourced from an acid sulfate soil (so does not meet (b)).

[1] See: Landfill Waste Classification and Waste Definitions 1996
[2] *Ibid*

These current definitions of clean and uncontaminated fill were published in 1996, prior to the establishment of the lithium processing industry in WA and hence the treatment of DBS in fill applications, as an alternative to freshly quarry sand or blended with freshly quarries or recycled sand, was not contemplated. In the numerous market opportunities Albemarle is currently pursuing, we are experiencing a definitional gap for DBS due to the prescription rather than outcomes focus of existing definitions.

Where DBS meets the properties required of clean fill, it should be considered clean fill and definitions should focus on the performance of the material and the outcomes required, not the manner in which the material is sourced. The current definitions in WA create barriers for new, alternative or innovative materials, and thereby constraining both circular economy opportunities and full value maximisation of the extracted natural resource.

Albemarle is currently working with the WA Department of Water and Environmental Regulation (DWER) and other relevant State Government authorities to resolve this issue.

4. Reform direction and Information request 4.2 Coordination mechanisms to enhance the benefits of sustainable procurement policies

The PC is exploring the potential for governments to introduce or expand delivery mechanisms around sustainable public procurement policies to facilitate coordination between suppliers, contractors and government agencies. This could include publishing information or connecting suppliers and users of recycled materials, as in Victoria's ecologiQ program.

The PC is seeking information on:
• the benefits and costs associated with introducing or expanding government-led coordination initiatives to support public procurement policies in different jurisdictions
• how further government efforts to facilitate coordination between suppliers, contractors and government agencies could be implemented to maximise net benefits to the community
• specific ways that coordination could assist suppliers of recycled materials to navigate sustainable procurement policy requirements and help government procurement agencies and suppliers identify win-win opportunities.

In Albemarle's view, one of the greatest levers available to Government (Commonwealth, State and Local) is their combined purchasing power and procurement strategies for infrastructure. In terms of large scale infrastructure in the Perth, Peel and South West regions of WA (the areas adjoining Kemerton, where DBS is produced), the WA Government has a near monopsomy on major infrastructure projects, often backed by Commonwealth Government funding. In order for DBS to achieve market adoption, whether as an aggregate or as an SCM, the WA Government must support its use in Government infrastructure projects where it is cost competitive, meets relevant performance requirements (including geotechnical, constructability and ongoing maintenance) and is safe from an environmental, human health and community perspective.

Given the enormous annual demand in WA for aggregates (and to a lesser degree SCMs), and given the relatively small annual DBS production, DBS would be expected to be a price taker based on the prevailing price of aggregates and SCMs. There is little evidence to date that a "green premium" exists for the use of an alternative to freshly quarried sand or traditional SCMs

despite the sustainability benefits of using DBS. It is commonly understood that the Perth, Peel and South West regions of WA face a future sand shortage, and, generally speaking, all new sand (basic raw material, BRM) quarries opened in the region tend to coincide with sensitive receptors including Banksia-threatened ecological communities, black cockatoo habitats, urban and peri-urban areas near residents or within water protection zones. Further, as DBS production is intrinsically linked to lithium processing, it will be produced regardless of aggregate and SCM demand. Therefore, in the absence of a market, the DBS must report to lower value uses such as void backfill for mine rehabilitation (often incurring significant greenhouse gas emissions for transport over long distances) or landfill disposal, consuming precious void space at landfills.

To date, Albemarle has supplied DBS for use in two WA Government-funded projects:

- The Wilman Wadandi Highway:
    - Embankment fill (aggregate, blended with freshly quarried sand to achieve particle size distribution and geotechnical performance requirements)
    - Stabilised cement (aggregate use in bound application where pumpability and hence small particle size was an advantage)
    - N25 footpath cement (aggregate material in non-structural cement[3])
- Armadale Line Upgrade Alliance (ALUA):
    - Fill material (aggregate, blended with freshly quarried sand to achieve particle size distribution and geotechnical performance requirements)
    - N32 footpath cement (aggregate material in non-structural cement)[4]

Albemarle will shortly commence a third infrastructure (road) project using DBS as fill material directly under pavement. This project, like the Wilman Wadandi Highway project, will be overseen by a Mineral Research Institute of Western Australia (MRIWA) research project to ensure Government involvement, expert advice and oversight of the project, all helping to build WA Government confidence in the use of DBS in infrastructure projects. Several WA Government departments, including Main Roads WA and DWER, are involved with the MRIWA research project, which is jointly funded by DWER and industry[5]. Albemarle welcomes the use of Government-Industry research partnerships to progress circular economy initiatives such as those completed through MRIWA for DBS.

In addition to completion of relevant research projects, demonstrations and studies (such as those mentioned above), for DBS to be broadly adopted in WA, the WA Government must ultimately amend its standard approach to infrastructure project materials procurement and design to enable the acceptance of alternative and innovative materials.

5. Reform direction and Information Request 7.1 Reducing regulatory barriers to circular economy opportunities for mining waste and alternative post-mining land uses

[3] As discussed in 3 above, DBS as a manufactured pozzolan does not currently meet AS for cements so is not used as the pozzolan.
[4] See prior footnote.
[5] See WA Government media release 3 February 2025: Lithium research partnership to advance WA's circular economy | Western Australian Government

The PC is considering whether there is scope to reduce regulatory barriers related to circular economy opportunities in mining waste and repurposing land post-mining. An assessment of these barriers across state, territory and Australian government policies could consider:

- *processes and permissions required to re-mine or re-purpose mining tailings*
- *regulations and practices that make it difficult for multiple operators to co-exist on a mine site*
- *restrictions on transporting mining waste*
- *regulation and practices that maximise net environmental, economic and social benefits from mine transitions, including repurposing infrastructure associated with mine sites*
- *regulations limiting the ability of new operators to take on mine sites for alternative higher-value uses, such as liabilities for legacy environmental impacts.*

The PC is seeking further information on:

- *specific examples of regulations that have impeded circular economy opportunities for mining waste or alternative uses for closed mine sites, and the expected benefits, costs and risks of reducing regulatory barriers (including quantitative analysis, where available)*
- *potential solutions to regulatory barriers, such as new regulatory frameworks or legislative changes*
- *specific areas of investigation or questions for an assessment of regulatory barriers related to mining waste materials recovery and repurposing closed mine sites*
- *the extent to which addressing regulatory barriers would increase the uptake of circular economy opportunities for mining waste and alternative post-mining land uses (including quantitative estimates, if available), or if other barriers would still prevent meaningful uptake.*

Reprocessing tailings and mine closure

With regards to 7.1, Albemarle highlights that tailings are reprocessed at both the Greenbushes and Wodgina lithium mines. Most hard-rock lithium mines are former mines of other minerals (typically tantalum and tin) reflecting the common geological co-existance of these metals and the prior global demand for those metals, but not lithium, at that time (hence lithium was "waste" and disposed of as waste rock or tailings).

Our experience suggests that reprocessing tailings in WA is a well understood and predictable regulatory process through both the *Environmental Protection Act 1986* (EP Act) and the *Mining Act 1978*, where the reprocessing is occurring at an operating mine – the same operator extracts fresh primary ore and undetakes tailings reprocessing for the same mineral. This would differ significantly if an alternative operator were to seek to reprocess tailings or if the reprocessing was proposed at a closed or abandoned mine (although, in WA, mineral rights can be split within a tenement and amendments have now been made to the EP Act to allow multiple oepratrors within the one prescribed premise. In these scenarios, it would be a more tortuous regulatory pathway, particularly if there was a risk of inheriting all historical rehabhilitation, contamination and closure liabilities). Reviewing the approach to potential inheritance of historic liabilities could increase the opportunities in WA for reprocessing tailings and re-mining. This is similar to the PC's observations in the Interim Report (Chapter 7.3, page 121) regarding the issue of

regulations that can shift legacy environmental liabilities from previous operators onto new operators inhibiting beneficial post-mining land-uses.

It is also worth noting that there is no tenement type under the Mining Act that allows for closure and rehabilitation (including the expected multi-decadal, post-mine closure monitoring). This is likely a reflection of the era in which the Act was drafted, a time when the focus on appropriate rehabilitation, closure and productive post-ming land-uses was not prioritised. A more appropriate tenement type should be added to the Mining Act (non-exclusive, non-productive but with appropriate rights and responsibilities for rehabilitation and closure) as well as a clearly defined relinquishment process.

Regulatory barriers for DBS usage
Albemarle provides the following examples related to DBS:

a) Treatment of coproducts (as opposed to waste) under the Critical Minerals Production Tax Incentive (CMPTI)

The CMPTI provides eligible recipients with a refundable tax offset of 10 per cent of the eligible costs of processing certain critical minerals in Australia. As an LHM produced, Albemarle expects to be eligible for the CMPTI.

Under the CMPTI, expenditure associated with outputs that have "no value and consistute waste" are considered eligible CMPTI expenditure and are therefore eligible for the refundable tax offset. As stated in the Explanatory Memorandum accompanying the *Future Made in Australia (Production Tax Credits and Other Measures) Bill 2025*:

> "There is no requirement to apportion expenditure merely because a registered CMPTI processing activity produces waste. Expenditure associated with waste arising solely from the production of a critical mineral is considered CMPTI expenditure. This recognises that the production of waste is an undesired cost, not an objective."[6]

If however a CMPTI eligible entity (like Albemarle) invests in further developing the non-critical mineral component of the feedstock to produce a usable product, this expenditure is no longer eligible. As stated in the same Explantory Memorandum:

> "However, in some circumstances the non-critical outputs are not waste. A company with non-critical outputs must reasonably apportion its expenditure on the registered CMPTI processing activity between the critical minerals output and the non-critical output…"[7]

The CMPTI specifically therefore discourages a circular economy approach that seeks to generate value from all the natural resources available to the producer and instead incentivises the production of waste through a tax refund.

[6] See 2.182 in https://parlinfo.aph.gov.au/parlInfo/download/legislation/ems/r7297_ems_00fa0e2e-bb91-4c72-9a66-086436d63677/upload_pdf/JC014789.pdf;fileType=application%2Fpdf
[7] See 2.183 in https://parlinfo.aph.gov.au/parlInfo/download/legislation/ems/r7297_ems_00fa0e2e-bb91-4c72-9a66-086436d63677/upload_pdf/JC014789.pdf;fileType=application%2Fpdf

Specific to Kemerton, this means that if DBS is not sold as a product but instead disposed of to landfill, all the costs associated with the production of DBS (including neutralisation, dewatering etc), its transport and disposal are eligible for CMPTI tax refunds.

However, if the DBS is sold as a coproduct (as is intended by Albemarle) reducing the demand for other freshly quarried sand and produces SCMs, none of the costs associated with the production of the DBS (including potential blending or further conditioning to meet customer needs) are eligible. Particularly where the development of a coproduct (instead of a waste) is marginal, this sort of tax disincentive, may inhibit the development, commercialisation and realisation of the coproduct. Albemarle notes that product development (coproducts) can be expensive and time-consuming and these coproducts are likely to be of a lower relative value compared to the main product (ie: more likely to be marginal).

This is a perverse outcome that is in stark contrast to the Terms of Reference provided by Hon Jim Chalmers MP (Treasurer) for this PC inquiry to "request that the Productivity Commission undertake an inquiry into Australia's opportunities in the circular economy to ***improve materials productivity and efficiency in ways that benefit the economy and the environment***"[8] (emphasis added).

b) *Recovered Materials Framework*

An example of a potential regulatory barrier to the circular economy in WA is the issue experienced by Albemarle in relation to DBS and its potential capture for primary production by the WA Government's proposed "Recovered Materials Framework". Although Albemarle and other industry members have successfully advocated that DBS should not be automatically considered a "waste" and highlighted that it is not "recovered" from a waste, it is periodically proposed that DBS should be captured by the Recovered Materials Framework as it is not the lithium product (it is a coproduct).

Albemarle supports the reform of WA legislation to provide better regulatory certainty for **wastes** that are **recovered** and transformed into products to be legally "products" again. This has long been an area of legal uncertainty in WA and hence why DWER is progressing this important reform. This reform may have application in future for DBS that has been disposed of by Albemarle (as surplus to market demand at the time) into landfill. Should this material be recovered, it would be necessary to have certainty regarding the properties and any potential post-disposal contamination (etc) that may have affected the material.

However, the Recovered Materials Framework should not be applied to the primary production of mineral products. As shown in Figure 1, Albemarle produces three products through Kemerton – all three products are sourced from SC 6.0, freshly mined and concentrated at Greenbushes, and processed through a highly specialised and tightly-controlled manufacturing process. The composition of the SC 6.0 (and other reagents) in the process are closely monitored and tested, well understood and highly consistent, with a chain of custody maintained throughout. As a primary product, directly produced at Kemerton, DBS is not "recovered" and it is not "waste" if it is a product that meets customer specifications and has economic use.

[8] https://www.pc.gov.au/inquiries/current/circular-economy/terms-of-reference

The mindset that coproducts are somehow automatically waste, perceived as more hazardous[9] or requiring more onerous regulation than other products is flawed and inhibits a more circular economy approach to the full suite of potential mineral products. All natural resources once extracted should be investigated for their highest and best use in a truly circular economy mindset. This is sometimes referred to as "full value mining" and is an approach that Albemarle supports. It makes no sense from a sustainability perspective to extract just one mineral or metal of interest (typically at low concentration) and then disregard or disadvantage the bulk of the rock material extracted, whilst at the same time quarry fresh basic raw materials (sand, rock, clays and other aggregates) when the mining process is already doing that.

Albemarle does not consider that additional regulation for DBS would support its adoption, adding cost and delay. Rather it should be regulated like any other product that is safe and geotechnically appropriate for use in its intended applications.

If DBS is allowed to compete as an aggregate and / or SCM, Albemarle expects that given the size of the aggregate and SCM markets in the region, 100% of DBS production would be used.

6. Information request 7.2 Ways governments could facilitate circular economy opportunities for mining waste and alternative post-mining land uses

The PC is seeking further information on:

- *ways that governments could better facilitate circular economy opportunities for mining waste and alternative post-mining land uses, such as improvements to regional planning and development, applying stricter standards on the production and storage of mining waste, or introducing disincentives for producing mining waste, such as mining waste levies*
- *the benefits, costs and risks associated with these options (including quantitative analysis, where available).*

The most significant way in which Governments could better facilitate circular economy opportunities would be to use their purchasing power for relevant products where these meet requirements and are cost competitive. They should not be excluded merely because they are non-traditional, innovative or sourced differently.

Additionally, and as discussed above, Governments should not over-regulate circular economy products. These products should be treated as other products are treated and allowed to compete on their merits, not automatically deemed or perceived as "waste", excluded from competing due to historic definitional gaps or deemed a sub-standard product by (lagging) Government policy. Wherever possible, Government regulation and policy (including procurement policy) should rely on outcomes and performance, not descriptive definitions that may inadvertently and unnecessarily exclude new products.

[9] To highlight the point, LHM – Kemerton's lithium product – is a Dangerous Good when transported due to its chemical characteristics. DBS is not classified as a Dangerous Good (being effectively crushed sand with gypsum and water).

Albemarle would caution against "introducing disincentives for producing mining waste, such as mining waste levies" until such time as Government has properly examined how it is creating barriers to the adoption of circular economy approaches and products. Particularly in relation to downstream processing of critical minerals, geology will determine the amount of the non-critical mineral product produced with these materials and most likely to find beneficial use in infrastructure projects – an industry dominated by government procurement and demand.

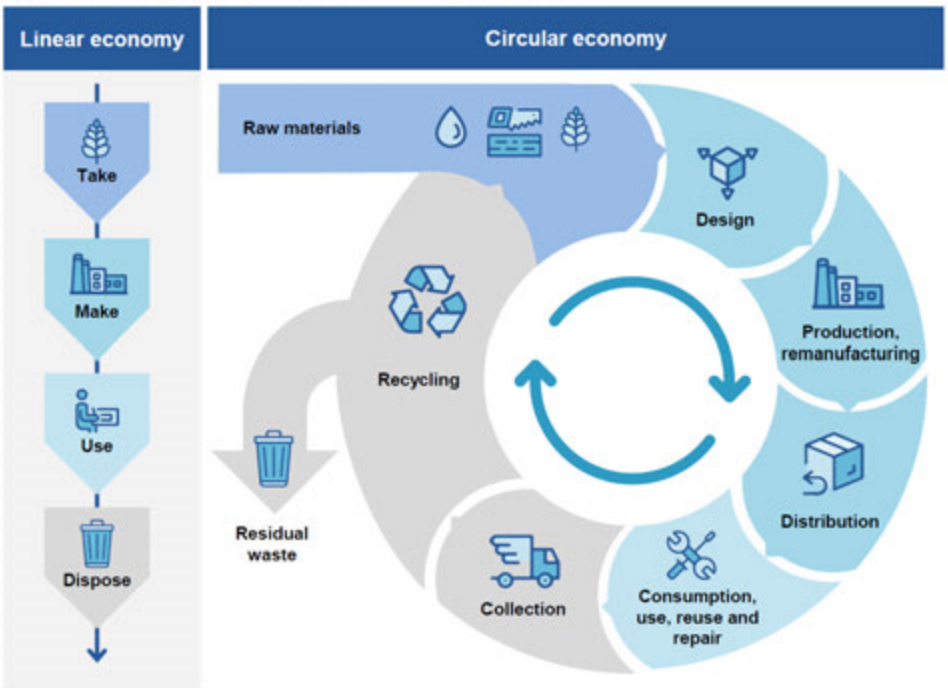
7. Other comments

On page 3 of the Interim Report, the current representation of the "linear" economy neglects to include the "dispose" pathways that currently exist on the first three stages and hence misses consideration of tailings, waste rock, overburden and coproducts associated with mining (and other manufacturing) processes.

Similarly, the "circular" diagram indicates that the raw material progresses through a single design and production pathway and neglects that, for mining, "waste rock", "overburden", "tailings" or "coproducts" will typically need to find uses in non-mining applications such as infrastructure projects and the built environment, highlighting the criticality of different sectors of the economy working together in order to achieve a more circular economy approach overall.

Albemarle also notes that in Chapter 7 Mining, the language tends to reflect a "waste" mindset rather than a "natural resource" or full-value mining mindset. For example, (Chapter 7.2, page 113) "Processing **waste** closer to the mining site … separate out **waste** earlier in the process reduce the need to transport large amounts of **waste** materials." This "waste" will be rock material that may well be appropriate as an alternative to other freshly quarried materials (basic raw materials). The term "downcycling" in also potentially unhelpful (used in the Interim Report in reference to material use in roads).

Figure 1 – Comparing the circular and linear economies



Finally, significant company resources have been committed towards research and development of DBS as a coproduct, including laboratory analysis and the road demonstrations cited on page 7 of this submission. Improved R&D tax incentives associated with coproduct development are an opportunity for Government to show its commitment to the circular economy and encourage industry to pursue more sustainable outcomes.

Should you require any further information in relation to this matter, please contact Bronwyn Bell, in the first instance.

We look forward to further opportunities to engage with the PC as the next phase of consultation for this inquiry progresses.

Yours sincerely

Tom Baddeley
Head of External Affairs, Albemarle Australia

Attachments:

- Delithiated Beta Spodumene (wet) Safety Data Sheet (SDS) 2024