

17 January 2018



HAFNIUM PRODUCT BREAKTHROUGH CONSOLIDATES DUBBO PROJECT BUSINESS CASE

Summary

- **Alkane's wholly owned subsidiary, Australian Strategic Materials Ltd (ASM), has developed high-purity hafnium dioxide products tailored to meet market requirements.**
- **Hafnium oxide exceeding 99.8% HfO₂, and 99.9% (Hf+Zr)O₂, has been produced using a proprietary process to separate hafnium from zirconium at the demonstration pilot plant at ANSTO.**
- **Over the past 12 months, ASM has consulted extensively with industry to confirm growing market demand for high-purity hafnium, which currently depends on supply from the production of zirconium metal for specialty alloys and the nuclear industry.**
- **Global shortage of hafnium anticipated as demand is poised to outstrip current supply.**
- **Hafnium metal for super alloys is currently trading in a US\$800 - \$900/kg range. The ASM business case assumes a conservative product price of US\$500/kg for its oxide.**
- **ASM will initially produce 25tpa hafnium to meet projected market demand, ramping up to higher quantities as required.**

Development of high-purity hafnium dioxide

Australian Strategic Materials Ltd (ASM), a wholly owned subsidiary of Alkane Resources, has successfully developed a high-purity hafnium dioxide (HfO₂) product that will be directly marketable as a feed material for a number of downstream applications and for producing metallic hafnium. The technical specifications of this material have been tailored to meet global market requirements, following extensive industry consultation over the past 12 months.

Metallic hafnium is the fastest growing market for hafnium and the most significant by volume, particularly due to the use of hafnium in superalloys and other aerospace alloys. The usual precursor is hafnium dioxide, which needs to be recovered from zirconium metal production streams. The high-

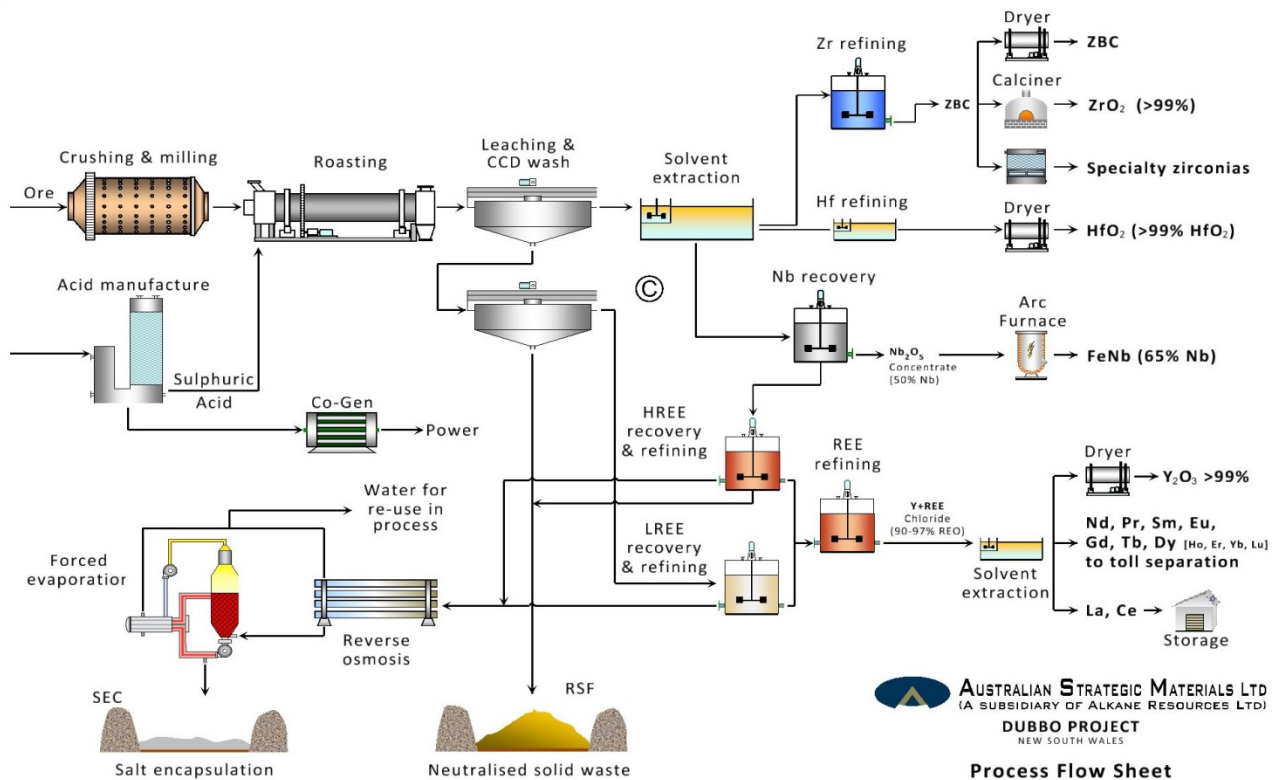
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purity hafnium dioxide developed by ASM exceeds 99.8% HfO_2 , and 99.9% $(\text{Hf}+\text{Zr})\text{O}_2$, providing the ideal feedstock for the high-purity metallic hafnium that is in demand for alloying purposes. A high purity hafnium chemical precursor has also been developed.

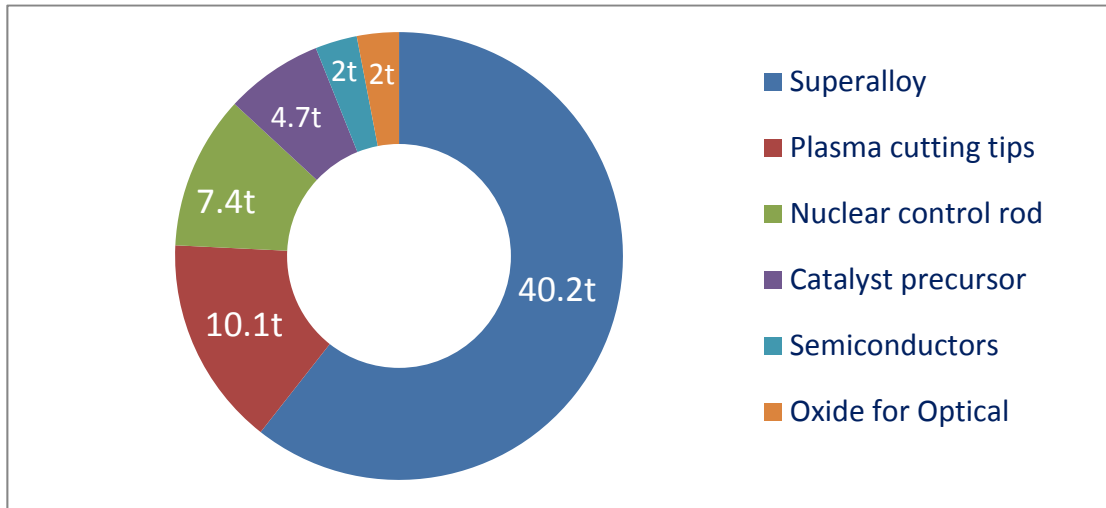
The new products were produced by a proprietary process at ASM's Demonstration Pilot Plant at the Australian Nuclear Science and Technology Organisation (ANSTO) in Sydney, New South Wales. The process flowsheet for the Dubbo Project consists of a sulphuric acid leach followed by solvent extraction recovery and refining to produce several products, including zirconium, hafnium, niobium and rare earths. The process pathway to recover hafnium was developed in 2015 and proved during 2017, and allows the flexible recovery of high-purity hafnium dioxide from the high-purity zirconium stream.

The development of this high-purity hafnium dioxide material demonstrates the ability of ASM to produce a highly marketable hafnium product out of the Dubbo Project. ASM will continue to work with industry to secure offtake agreements and develop further enhanced products, with the view to establishing a customer base for hafnium products ahead of plant commissioning.

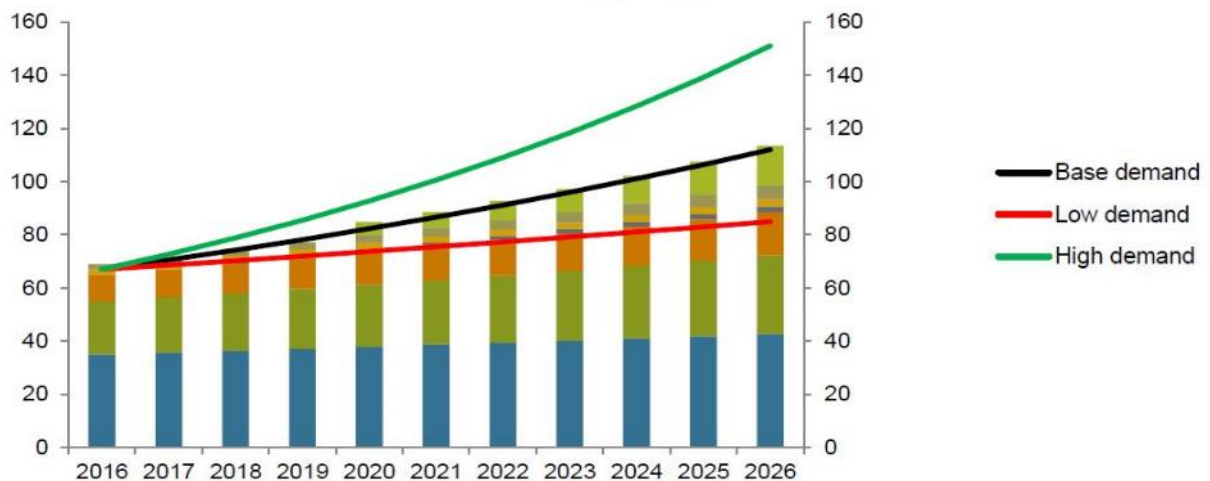


Hafnium market and outlook for future growth

Global demand for hafnium is rising particularly for use in metallic form, which currently accounts for around 85 per cent by volume (60% superalloys, 15% plasma cutting tips, 10% nuclear control rods). Emerging aerospace applications are expected to consume further significant volumes of metallic hafnium. Hafnium dioxide is meanwhile emerging as a material of choice in semiconductors and data storage devices (ferro-electric applications), while many future industries such as those based on its thermo-electric properties and super high temperature ceramics for supersonic aircraft and space vehicles will also rely on materials containing hafnium.



Projected growth in demand is poised to exceed current production, which is limited to about 70tpa (83tpa HfO₂), since hafnium is typically only extracted from zirconium processing streams for nuclear energy applications requiring high-purity zirconium. Market research by ASM and independent international market consultants forecasts a 2026 base demand of 112tpa (132tpa HfO₂), and an unconstrained high-demand case of 151tpa (178tpa HfO₂).



The Project represents a unique source of hafnium that is independent of all traditional markets – including China (currently accounting for at least 75% of world production of zirconium materials, and over 95% of zirconium chemicals), the nuclear zirconium industry and the zircon industry in general. To ensure a sustainable business case, the ASM processing plant will undergo staged ramp-up in production volumes to keep pace with world demand. Start-up volumes will be around 25tpa hafnium metal (30tpa HfO₂), increasing in line with market growth; full plant capacity is conservatively estimated at 200tpa.

Hafnium product pricing remains opaque due to security issues and limited production but the metal for super alloys is currently trading in a US\$800 - \$900/kg range. The ASM business case assumes a conservative product price of US\$500/kg for its oxide.



Competent Person

Unless otherwise advised above, the information in this report that relates to exploration results, mineral resources and ore reserves is based on information compiled by Mr D I Chalmers, FAusIMM, FAIG, (director of the Company) who has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves. Mr Chalmers consents to the inclusion in this report of the matters based on his information in the form and context in which it appears.

Disclaimer

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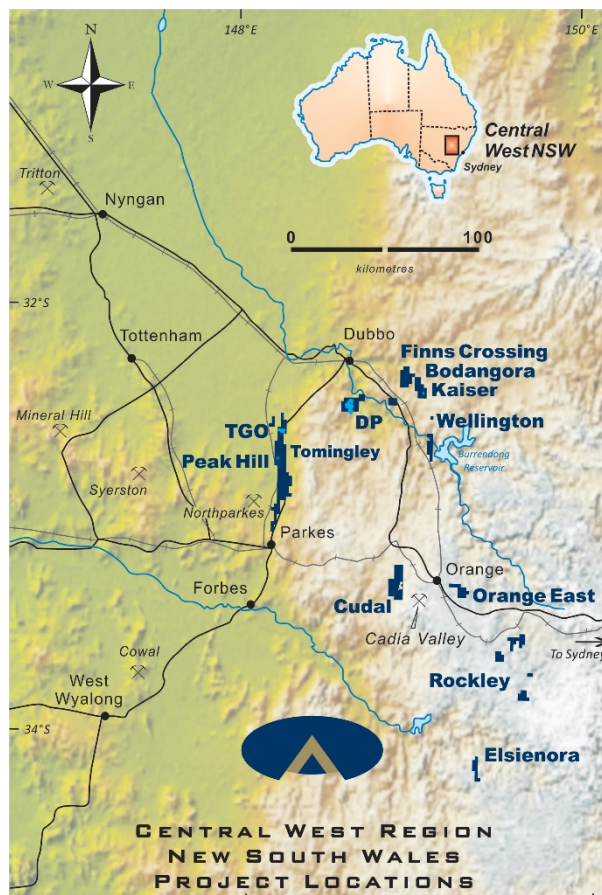
This document has been prepared in accordance with the requirements of Australian securities laws, which may differ from the requirements of United States and other country securities laws. Unless otherwise indicated, all ore reserve and mineral resource estimates included or incorporated by reference in this document have been, and will be, prepared in accordance with the JORC classification system of the Australasian Institute of Mining, and Metallurgy and Australian Institute of Geoscientists.

ABOUT ALKANE - www.alkane.com.au - **ASX: ALK and OTCQX: ANLKY**

Alkane is a multi-commodity company focused in the Central West region of NSW, Australia. Currently Alkane has two advanced projects - the Tomingley Gold Operations (TGO) and the nearby Dubbo Project (DP). Tomingley commenced production early 2014. Cash flow from the TGO has provided the funding to maintain the project development pipeline and has assisted with the pre-construction development of the DP.

The DP is a large in-ground resource¹ of zirconium, hafnium, niobium, yttrium and rare earth elements. It is the most advanced poly-metallic project of its kind outside China, making it a potential strategic and independent supply of critical minerals for a range of sustainable technologies and future industries. It has a potential mine life of 70+ years. The DP is construction ready, subject to financing, with the mineral deposit and surrounding land acquired and all State and Federal approvals in place.

Alkane's most advanced gold copper exploration projects are at the 100% Alkane owned Bodangora, Wellington, Rockley and Elsenora prospects. Wellington has a small copper-gold deposit which can be expanded, while at Bodangora a large monzonite intrusive complex has been identified with porphyry style gold copper mineralisation. Gold and base metal mineralisation has been identified at Rockley and Elsenora.



¹ ASX announcement 19 September 2017 Dubbo Project Resource and Reserve Statements FY17. The Company is not aware of any new information or data that materially affects the information included in that announcement and confirms that all the material assumptions and technical parameters underpinning the estimates continue to apply and have not materially changed.