

ALCORE Limited

Reducing import reliance for
aluminium smelting

FLUORINE **FORUM** 2021

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ONLINE



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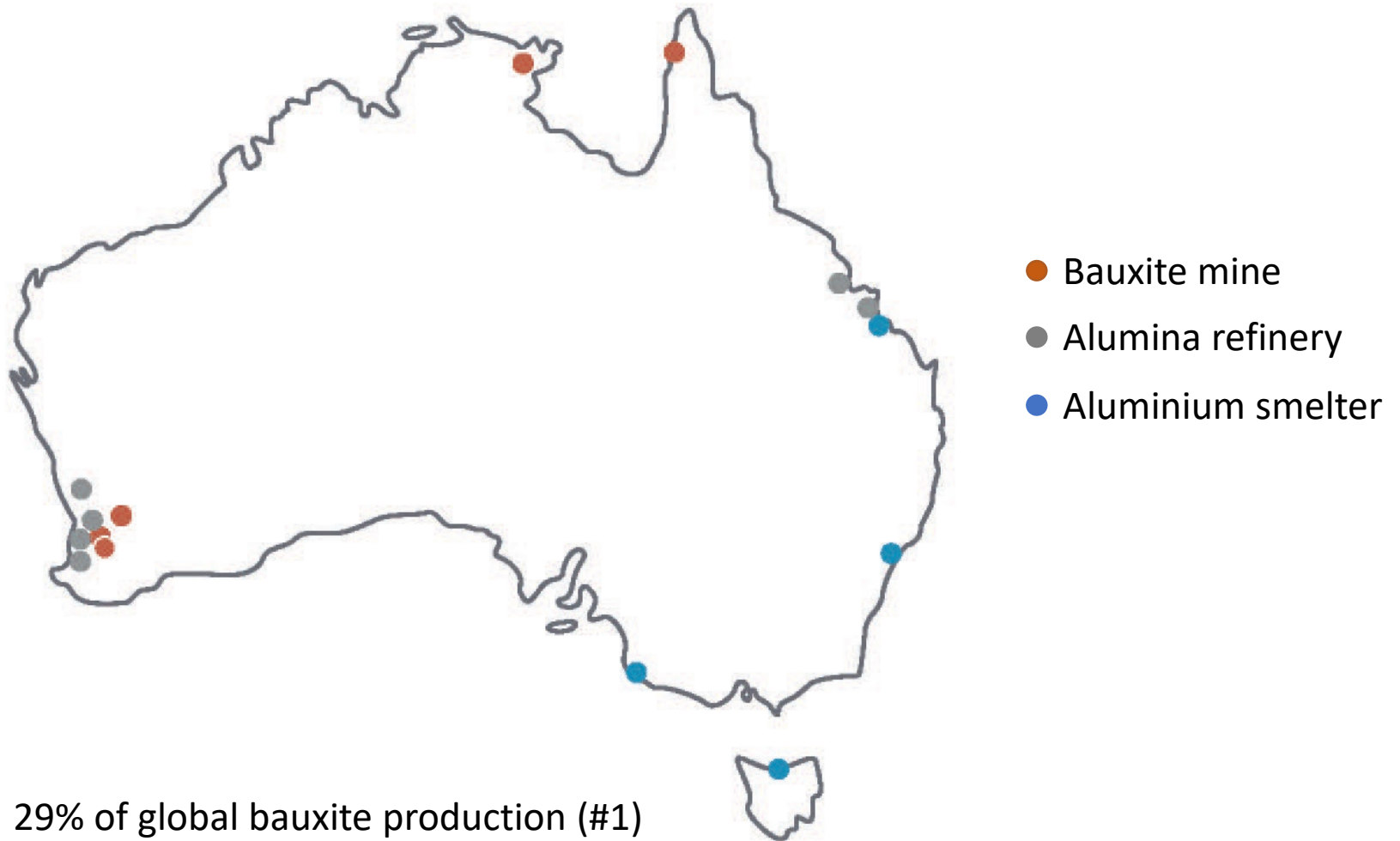
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Prices for aluminium fluoride (AlF_3) were sourced from Asian Metals, China Customs and verified by comparison with prices from Bloomberg. The price actually achieved will depend upon market conditions at the time of sale.

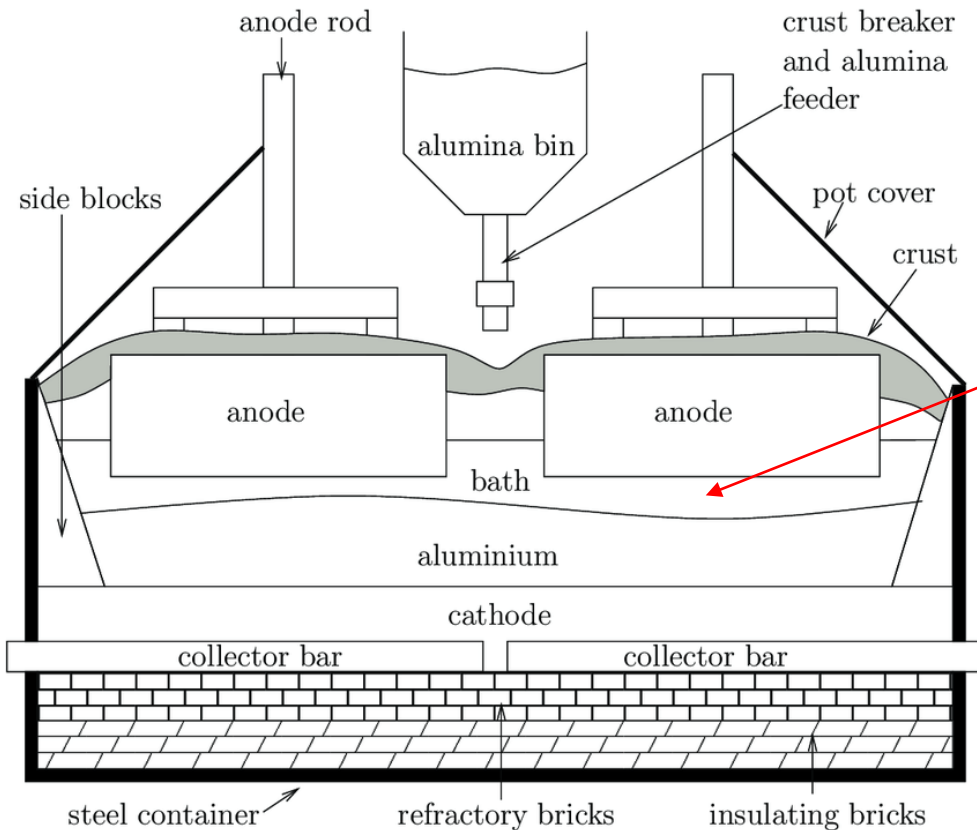
Australian mines, refineries and smelters



29% of global bauxite production (#1)
15% of global alumina production (#2)
2.5% of global aluminium production (#6)

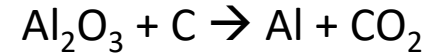
Aluminium Production

Aluminium fluoride (AlF₃) is essential



Aluminium reduction cell

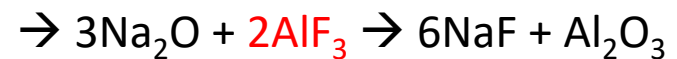
Production of aluminium:



Na-Al-F-based electrolyte ('bath')

Fluorine is lost to refractories and emissions

Alumina contains ~0.4% Na₂O



→ AlF₃ must be added to neutralise Na₂O in alumina

→ Results in production of bath

Australian AlF_3 supply

100% imported



Producing AlF_3

Aluminium source

- Other materials have significant aluminium content, not dissimilar to alumina trihydrate:
 - Bauxite: $\text{Al}(\text{OH})_3$, Fe_2O_3 , SiO_2 , TiO_2
 - Dross: Al_2O_3 , AlN , Al metal, Na-Al-F compounds,...
- Can produce AlF_3 by controlling chemistry to prevent impurities reporting to AlF_3
- Requires wet route \rightarrow LBD AlF_3

Bulk density

LBD and HBD AlF_3

- HBD and LBD perform equivalently in pot
- HBD more common: smelters are more familiar with it
- HBD flow properties more similar to alumina: easier to convey
- LBD has higher F content: can be managed through pricing
- HBD has lower volume: cheaper to transport and store

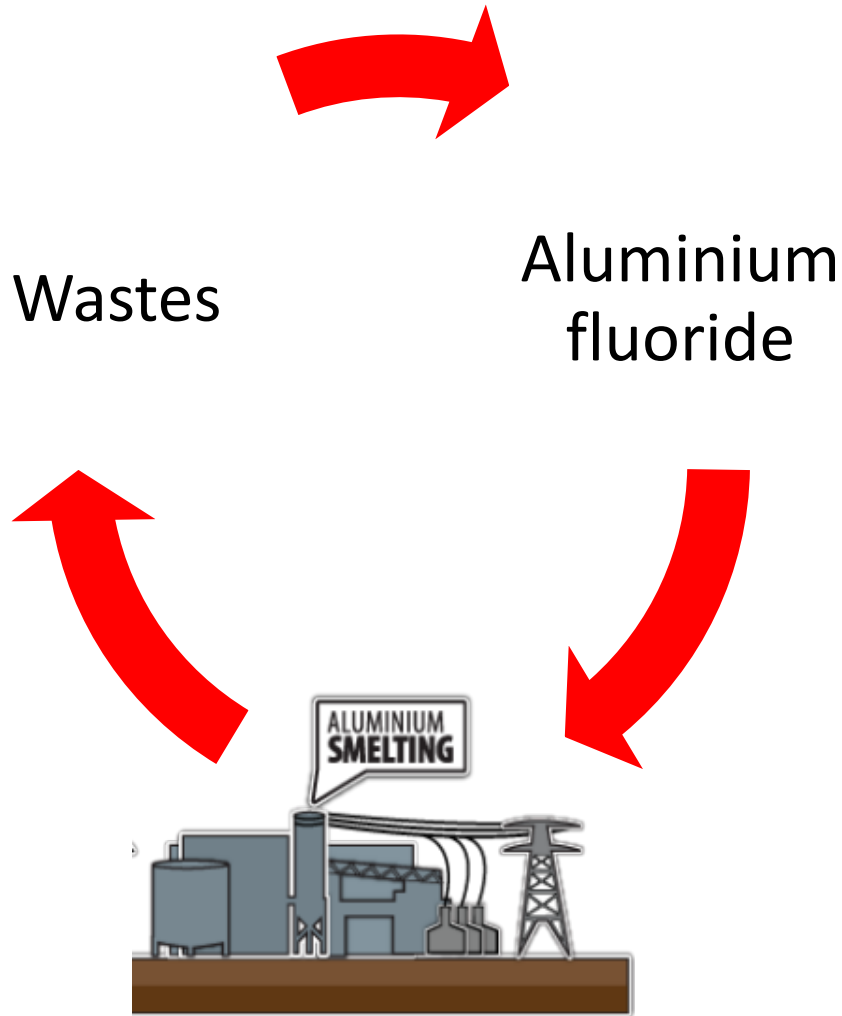
All things being equal,
smelters typically prefer HBD AlF_3 ,
BUT
other things are rarely equal...

Producing AlF_3

Fluorine source

- Most smelters produce 'excess' bath. Typically sold to other smelters that require bath
 - Net bath production in Australia
- Opportunities
 1. Produce AlF_3 from bath
 2. Produce HF from bath
- Challenges
 - Bath contains multiple Na-Al-F compounds
 - Na-Al-F compounds are very stable
 - Need to separate multiple co-products

Alcore strategy



Alcore will use aluminium smelter wastes to produce aluminium fluoride in Australia

Commercialisation plan

- First Alcore plant planned for Bell Bay industrial area in northern Tasmania
- Initial capacity 10,000 t/y aluminium fluoride:
 - To initially supply ~35% of Australia/NZ demand
 - Will expand to 30,000-60,000 t/y, subject to customers, low-cost feedstock sources and/or additional locations
- Initial production can use alumina trihydrate for good returns and lower risk
- Bauxite and dross show promise as lower-cost feedstocks to substantially increase profitability

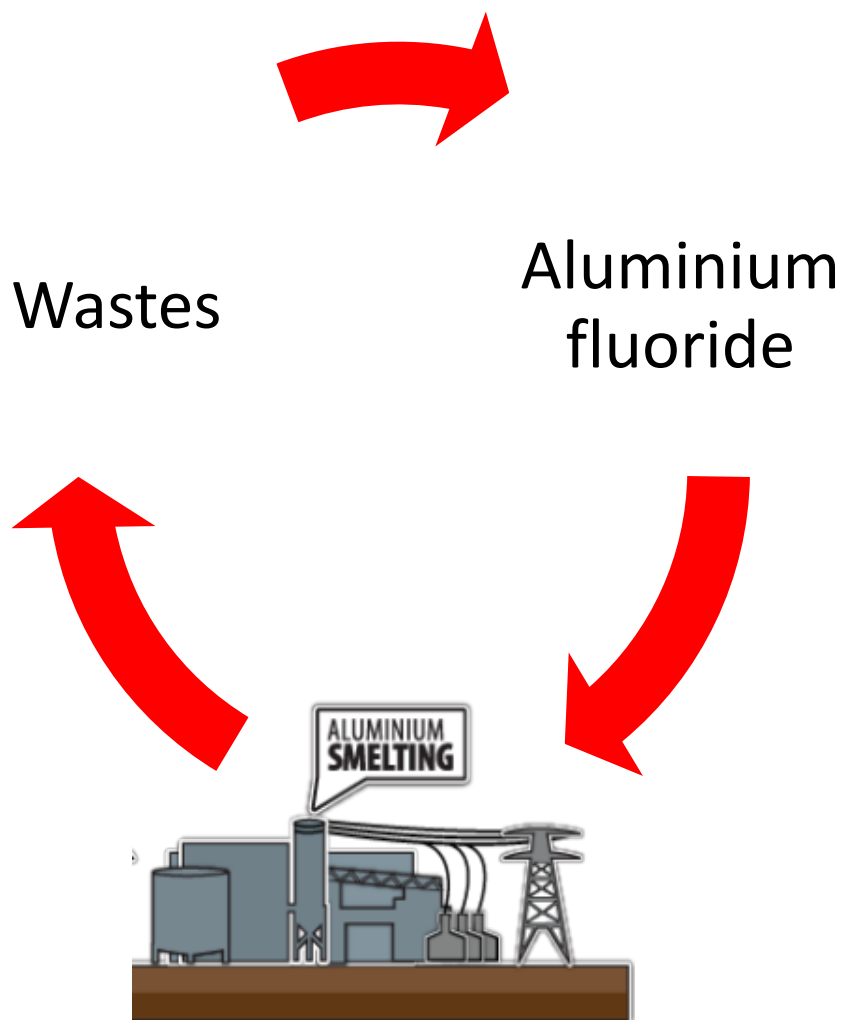
Technical Status

- Alcore laboratory commenced operations July 2019
 - Only laboratory in Australia suitable for operation with concentrated fluorine acids
- Critical prerequisites have been confirmed in laboratory
 - Recovered fluorine from bath
 - Produced LBD AlF_3 from alumina trihydrate
 - Produced LBD AlF_3 from dross & bauxite
- Commencing pilot plant



Alcore

Reducing import reliance for aluminium smelting



Alcore will use cheaper raw materials in a proprietary process to produce commercial grade AlF_3 at low cost in Australia

Thank you

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