

Canada

AEM Expands its Production Site in Cap-Chat for Low-Emission HPA (High Purity Alumina)

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Advanced Energy Minerals Inc. (AEM) is the sole metal oxide producer that can claim almost zero carbon footprint for all its products. AEM has developed a full-scale production plant at Cap-Chat, Quebec/CA, which manufactures alumina and aluminium derivatives at purity ranges from 3N5-5N (99,95–99,999 %) using the CLCP process, currently undergoing expansion to double capacity.

Chlorine Leach-Crystalline Purification (CLCP) of HPA

AEM's proven Chlorine Leach-Crystalline Purification (CLCP) process emits much fewer carbon emissions than the alkoxide process. The CLCP process produces almost zero waste. Hydrochloric acid, an important input chemical, is recycled many times within the process before being discharged. In Fig. 1 the CLCP process is shown. An aluminous feedstock is subjected to digestion with hydrochloric acid (HCl) and is converted to aluminium chloride and water. Aluminium chloride is then subjected to purification and crystallization. The resulting filtrate solution (mainly aluminium chloride) is sold as a by-product. The aluminium chloride is subjected to thermal decomposition where the acid is retained and recovered. Aluminium chloride is subjected to two stages of thermal decomposition at high temperatures to form alumina or aluminium oxide. This aluminium

oxide is subjected to a final treatment where residual impurities are removed and treated. The aluminium oxide is further subjected to grinding and drying which forms the SUPALOX product. The SUPALOX can be further subjected to compaction to form pucks called SUPPUCK e.g. sold to the sapphire industry. The plant is powered entirely by hydroelectricity, thereby not only achieving excellent environmental performance, but also insulating its customers from fossil fuel price volatility.

The patented CLCP process – developed in-house – offers a step change industry improvement in the manufacture of high purity alumina and other aluminium derivatives in terms of cost, energy intensity and environmental performance.

The process has been tailored to rely solely of electricity for its energy needs such that, when powered renewably, it can achieve close to zero Scope 1 and Scope 2 emissions (Scope 1 emissions – 0,00 kg CO₂e/kg alumina produced; scope 2 emissions – 0,06 kg CO₂e/kg alumina produced).

This is in strong contrast to those using the traditional alkoxide process, typically non-renewably powered, which emits 12,3 t of CO₂ per ton of HPA. Other producers have a goal of reducing this by a factor of five, which is still very high [1].

AEM has been awarded as one of the Top 10 Climate Change Solutions Providers in Canada 2023.

AEMs market activities

AEMs marketing approach is to be evangelists of the decarbonization of the sector and market its products as high quality and high purity products, but also sustainable.

AEM is acting at global level and over the last years has developed a network of partners and distributors that are in close contact with partners and customers in three continent and more than 26 countries. With the production facilities in North of Quebec/CA the supply comes from one of the most stable economies in the world, which, for the customers, translates in reliable supply, without turmoil due to political tension or internal disruptions.

High purity alumina and more in general other aluminium derivatives, like for instances aluminium hydroxides, are widely used in a large number of applications. The most important sectors are: technical ceramics, sapphire production, pigments, batteries, catalysis and glass manufacturing. On top of these applications, there are a number of industries that use high-purity alumina for sometimes totally unexpected uses, and this is the reason why AEM is so keen to promote these products across a large spectrum of industries.

AEM has also a marketing project called "the green alliance for sapphire", and it is about a kind of consortium of companies active along the sapphire glass value chain that acknowledge that sapphire is

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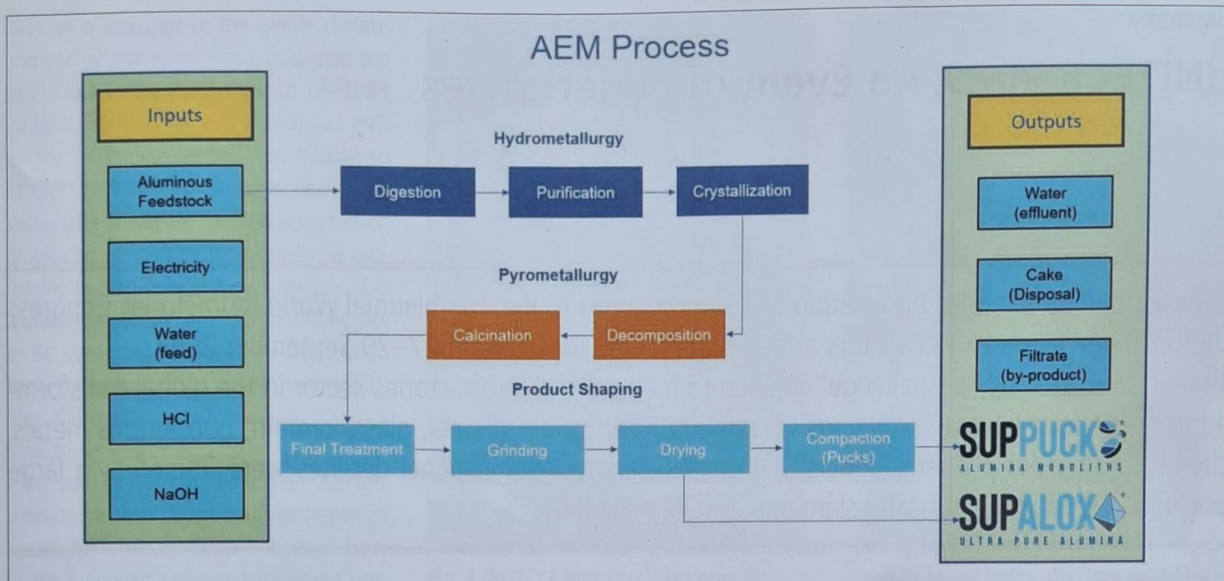


Fig. 1 Chlorine Leach-Crystalline Purification (CLCP) process developed by AEM

not a sustainable product and its production causes significant carbon emissions. Moreover, the partners in the alliance are committed to working to bring to the market a more sustainable sapphire, and by doing so, contributing to the decarbonization of the industry.

For sapphire, the global market for these crystals attained a value of USD 903,3 million in 2021, according to the IMARC Group. They anticipate this figure to escalate to USD 2471,4 million by 2027, with a CAGR of 18,5 % during the period from 2022 to 2027. One of the drivers is their ap-

plication for LEDs. This is just one example to demonstrate that the market for HPA is growing.

References

- [1] OPTEL Carbon footprint assessment report for Advanced Energy (upon request)

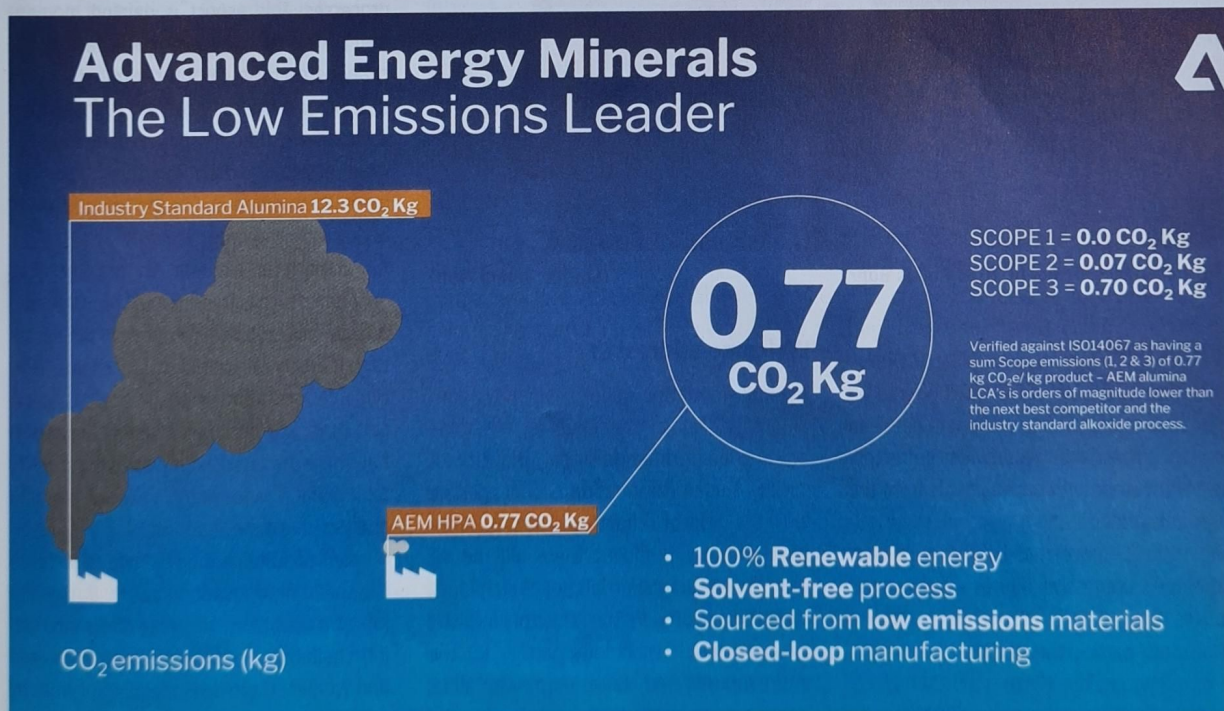


Fig. 2 Low emission leadership by AEM