

# **Molten Salt Batteries – Hot but not Flammable**

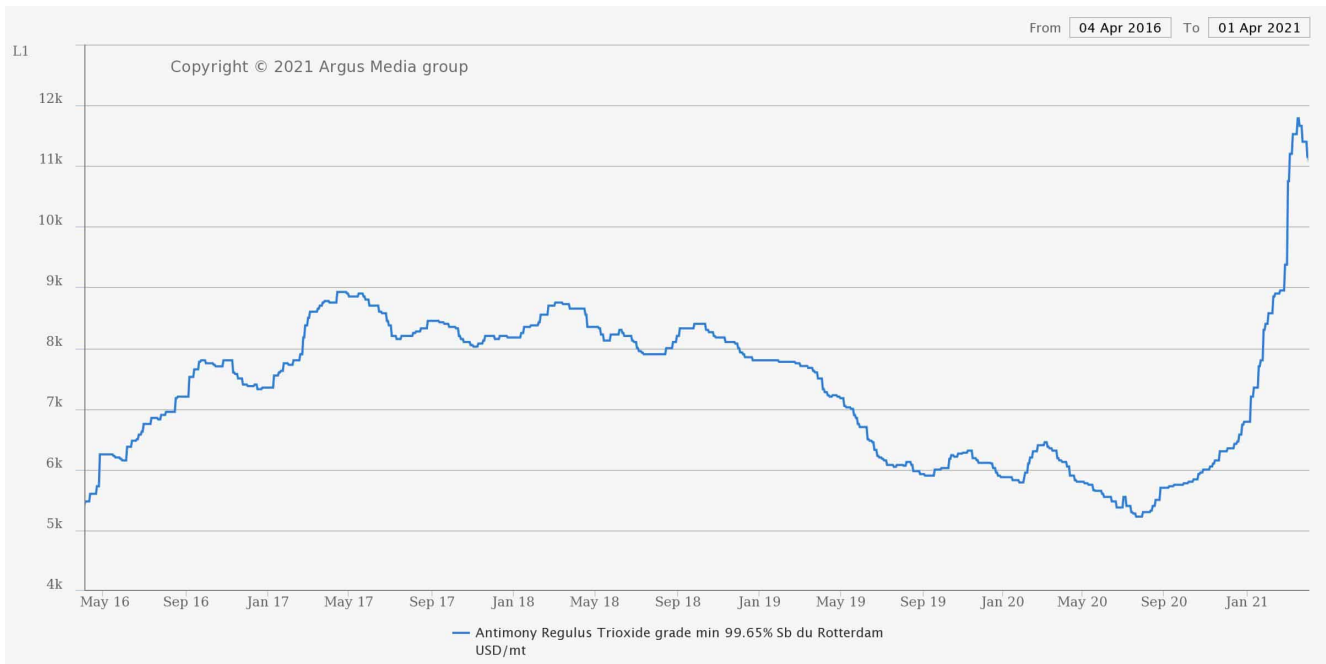
When we first wrote for InvestorIntel on Molten Salt battery technology almost half a decade ago, the technology was already five years in the making, but it has now taken a further five years for it to get traction amongst end-users.

However, in this Third Wave of battery metals, Antimony (the prime component in Molten Salt batteries) has joined the ranks of battery metals and the hunt is on for that scarce commodity, the non-Chinese Antimony miner.

## **Antimony – Lighting a Fire under the Price**

The price of this metal has taken off in recent times on a combination of global shortages caused by the Pandemic and the coup in Burma, long-term underinvestment, declining Chinese production, and the arrival of Molten Salt batteries in the commercial marketplace.

The effect was stunning, with Antimony breaking out of a multi-year malaise and becoming the hottest metal in the last six months (though tussling with Tin for that title).

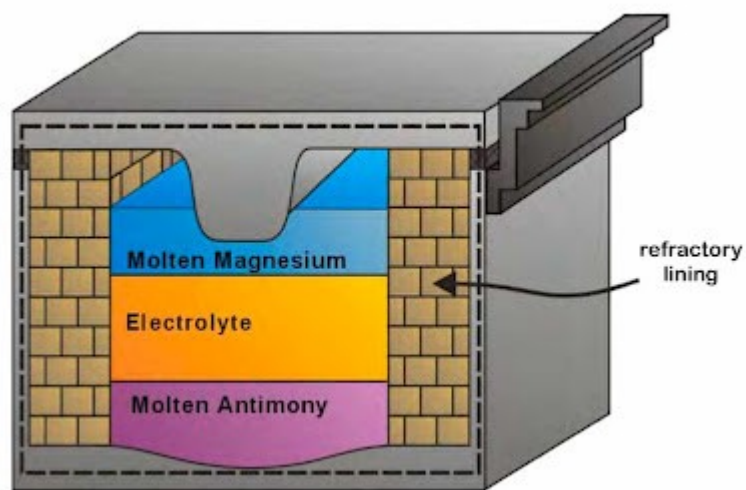


## Mass Storage Devices

The important consideration is that mass storage devices do not even need to be connected to the grid and thus can be in the middle of nowhere bridging the infrastructure gap (and cost) that weighs on emerging economies (and isolated mine sites).

And then there are liquid metal batteries using molten salts. The origin of using these salts for storing energy goes back to the Second World War.

Molten salt is a solid at standard temperature/pressure but enters the liquid phase under elevated temperatures. Liquid metal batteries can be stored indefinitely (over 50 years) yet provide full power in an instant when required. Once activated, they provide a burst of high power for a short period (a few tens of seconds to 60 minutes or more), with output ranging from watts to kilowatts. The high power is due to the high ionic conductivity of the molten salt, which is three orders of magnitude (or more) greater than that of the sulphuric acid in a Lead-acid car battery.



A team of researchers at MIT led by Professor Donald Sadoway worked on a liquid battery system that could enable renewable energy sources to compete with conventional power plants.

The research was put into a commercial venture, called Ambri, which was funded to the tune of \$15M by Bill Gates, energy giant Total, the US Department of Energy's Advanced Research Projects Agency and Khosla Ventures (run by Sun Microsystems co-founder Vinod Khosla).

### **What this means for antimony Demand**

Each GWh of Ambri batteries requires less than 1% of current annual production of these (calcium and antimony) anode and cathode materials. This is the closest we have to divining how much Antimony that the Ambri product line might consume if it gains traction. Current antimony production is around 170,000 tonnes per annum, implying that a Gigawatt of Ambri cell utilizes 1.7 tonnes of Antimony.

Higher prices are rather a "chicken-and-egg" issue for the likes of Ambri. To be sure of adequate supplies of metal higher prices are needed (probably over \$8,000 at least) and yet if they go too high then the viability of the economic equation is cast into doubt.

**United States Antimony Corporation (NYSE American: UAMY) – Collateral Beneficiary?**

As the main Antimony producer in North America (and we use the word “producer” very generously) this company was finding it hard to get two dimes to rub together in 2020. To add to the woes its long-term CEO (who was in his 80s) died.

The price of the stock started to rise slightly on the Antimony price rally but then... in February of 2021 it announced an offtake deal with Ambri... then followed a massive financing (\$14.3M) with Roth Capital Partners... the stock then soared and the rest is history. The fact that it doesn't have a proper mine is a mere detail.



Despite all that such is the uplift that Antimony stocks can achieve in a market starved for options in this metal. The only other plays are the gold/silver miner, Mandalay Resources Corporation (TSX: MND | OTCQB: MNDJF) that has Antimony as a byproduct from its Costerfield mine, and Perpetua Resources Corp. (NASDAQ: PPTA | TSX: PPTA) (formerly called Midas Gold – that is controlled by the famed Paulson hedge fund group) but is not in production at its Stibnite Mine.

## Conclusion

If Liquid Metal Batteries become the killer application in grid-linked storage (or non-grid linked) then it potentially lights a fire under Antimony demand and pricing.

To mix some metaphors, molten salt batteries have flown under the radar thus far but definitely have a place in the evolving battery universe and hopefully will take the Antimony market along for the ride.