Why lead matters as much today as ever before

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For millennia, lead has been part of human civilisation. It has always been relatively easy to find, easy to refine and easy to use – over and over again. Today we would call it low-cost, reliable and re-usable; and we spend much of our time seeking commodities that hit these criteria because those commodities are both valuable and sustainable.

Allow me to lay my cards on the table. I am a career miner of over 30 years. I have spent much of that time producing metals like tin, zinc and lead, and I head a company that is developing a silver, zinc and lead mine. So, to be sure, I have a vested interest. But that does not make the facts wrong, the logic incorrect or the conclusions invalid. I think it is important to put the case for lead – to explain the reasons for current strong market demand and future growth – and to bring the debate back to reality.

Lead has had a chequered past. Every schoolchild learns about lead pipes in ancient Rome and we have seen in recent years the removal of lead from petrol, cast brassware and solder. Toxic? Yes, as are many metals including nickel, cadmium and cobalt. So, removing it from applications with high human or environmental exposure is a good idea. But lead is also readily available, relatively cheap, and easily recycled. In the right applications it makes a lot of sense.

Storage of electricity is the modern application to which lead is most suited – lead batteries are cheap to buy; safe, efficient and reliable in use; and readily recycled at the end so that the chain of custody is secure. Yet, as the world embraces renewable energy, we have somehow leapt upon lithium, nickel, cadmium and cobalt as the best way to store it. Teslamania, perhaps?

A typical small lead storage battery

Image: www.made-in-china.com

Don't get me wrong: in mobile applications – where the portability of your power supply matters most – lithium batteries are (for the moment) the answer. We find them in mobile phones, cordless appliances and, of course, electric vehicles.

But most of the world's energy is not used in mobile applications. It doesn't need to be carried around and, with the advent of accessible renewable generation via wind and solar, it doesn't even need to be transmitted to the end-user as often or as far as in the past. Renewable energy can be generated locally: anywhere the wind blows or the sun shines, the technology works. This has enormous implications for humankind. Billions of people currently do not have reliable access to grid power and many of those will never have any access. There are 700 million people[i] in sub-Saharan Africa alone,

who spend their meagre energy budget on kerosene for lighting because the alternative is to live in the dark.

Of course, renewable power needs to be stored because generation only works when the sun is shining or the wind is blowing. Unless you have a large dam for a pumped hydro system, that means a battery. Looking at it from atop our shining city towers, we might select a lithium solution. Rich countries with populist political landscapes could easily be seduced: Lithium is new, and if it works in a sleek sporty EV it must be right everywhere. Thousands of dollars for a Powerwall on the back of the pool house? – no problem. Many tens of millions for a grid-scale unit? – easily done.

An advertising photograph for Pawame, a provider of low-cost solar and battery systems in Africa

Image: Pawameafrica.com

But what about the millions upon millions of people with just a few dollars per month for their total energy budget? People for whom just being able to light their home and charge their smartphone would change their life? No lithium here, it's just too expensive.

There is a quiet revolution taking place, and it isn't happening in Sydney or London or Beijing. It's happening in dusty villages that you've never heard of. Children, who for the first time can do their homework by electric light and their research on the internet, are joining the connected world in their droves. And it's powered by lead. Lead is cheap – Companies like Bboxx offer kits containing solar panels, a lead battery, lights and a phone charger for US$8.80 per month[ii]. Lead is safe and reliable – the battery won't stop working if the charging cycle is not ideal and it won't catch fire if it's stored incorrectly.

Bboxx's basic offering

Image: Bboxx.co.uk

And lead is recyclable – families can trade old for new economically and, because there is real value in recycling lead, almost none goes to landfill. As a global community we should be celebrating, not shunning, one of humanity's oldest metals.

Of course, it's not just the subsistence market that needs lead. If it's better for them, it's better everywhere. To put it another way, lead batteries are much better value per unit of stored energy when you consider up-front cost, usable life, real-life performance, and the environmental cost at the end of life. Holistic thinking? How novel. An awkward fact, but we don't recycle our lithium batteries. The Australian scientific research group CSIRO reported in 2018 that just 2% of that country's Li-ion battery waste is recycled, compared to 98% of its discarded lead-acid batteries[iii]. In fact, according to the International Lead Association, lead-acid batteries are the most recycled consumer product on the planet with lead recycling levels now at 99% in the US and UK [iv].

We can't even stockpile used lithium batteries safely, so what's going to happen as the early adopters turn in their used EV batteries and begin to replace their Powerwalls? Awkward today, but disastrous in a few years' time. Sadly, we are quite skilled at ignoring things like this – witness the stockpiles of rubber and plastic around the world that were supposed to be recycled. If we will do it with car tyres, why expect it to be different with lithium batteries?

Let's talk about Electric Vehicles. Won't they kill the internal combustion engine and with it the lead-acid battery? Sorry, but no. You see, it's another awkward fact, but every EV contains a lead-acid battery. That's one per vehicle - just as many as in petrol or diesel vehicles. Why? Cost and reliability. Cars and vans have 12V electric systems and that requires a 12V battery. Small, low-voltage lithium batteries are eye-wateringly expensive, as anyone who runs a set of cordless appliances will know. Ten or more times the cost of the equivalent lead battery and, in a vehicle, the few extra pounds are really not noticed. Auto manufacturing is a competitive business and competitive markets have the ability to flush out things that are poor value for money. The market has spoken: if weight is not an issue, as we see in the 12V auto battery market, then lead-acid batteries are better value for money than their competitors.

Under the hood of a Tesla Model S EV – note the deep cycle lead-acid battery.

Image: insideevs.com

I'm not anti-lithium. I'm pro-logic. I'm rational, like the market that selects lead-acid batteries to power the 12V systems in all light vehicles, and the market that selects lead-acid batteries to store electricity in home and village-scale solar systems. This is the same market that has sustained lead prices in the face of populist arguments to the contrary: According to Concord Resources Limited, lead experienced

4% compound growth year on year between 1998 and 2017[v] and that didn't happen by accident. Far from being on the way out, lead is a world-wide necessity.

Let me leave you with a prediction: Lead is here to stay. One of civilisation's oldest metals will deliver the first electricity in history to its poorest members and at the same time will play its part in the global rise of electric vehicles. Lead's availability, utility and recyclability will continue to drive demand and price for decades to come, probably for centuries. So, if you ask me what metals I would bet on for the future, I'm betting on lead.

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[i] www.philanthropyage.org "Beyond the grid"
[ii] www.bboxx.co.uk Rate mentioned was current for Kenya at the time of writing
[iii] www.csiro.au September 2018 case study "Lithium-ion battery recycling"
[iv] www.ila-lead.org Lead recycling fact sheet
[v] http://www.ilzsg.org Investment in lead and zinc resources – drivers and constraints, Concord Resources Limited