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Challenges facing lead producers and consumers over the next five years

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RECYCLE 100
9TH INTERNATIONAL SECONDARY LEAD & BATTERY RECYCLING CONFERENCE
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Lead industry is not a stranger to challenges

- Past 50 years have seen many changes in both production and consumption of lead
- Wider recognition of lead's toxicity saw greater control of emissions related both to production, but also consumption of lead
- In the USA the Clean Air Act of 1970, and its subsequent amendments, resulted in the phasing out of lead in petrol/gasoline and contributed to the closure of primary lead smelter capacity from the beginning of the 1980s
- Many countries also introduced new and tighter environmental controls with similar impact on primary lead smelting and uses of lead in chemicals and fuel
- Some smelters remained in business by closing older facilities and investing in new technology such as QSL, Kivcet and TSL furnaces, while others introduced modifications and much better controls on emissions to meet new and ever-tightening standards
- Environmental controls and compliance not the only challenge – low prices, rising energy costs and emergence of competition from China in early 2000s resulted in permanent closure of further capacity post-2000, especially ISF operations

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Some significant end uses have disappeared

- Most dramatic loss of end use in past 50 years was the elimination of leaded fuel for vehicles
- Manufacture of tetra ethyl lead (TEL) in the major markets of North America and Europe accounted for at least 10% of lead demand in 1980
- Phase out of leaded gasoline began in Japan in 1970 but TEL accounted for little more than 2% of global lead demand by early 1990s.
- Significant efforts have also been made to reduce use of lead in a variety of chemicals, solders, shot and other applications
- In 1980 close to 50% of lead demand was in batteries.
- By 1990 this was over 60%, 75% by 2000 and today over 90%

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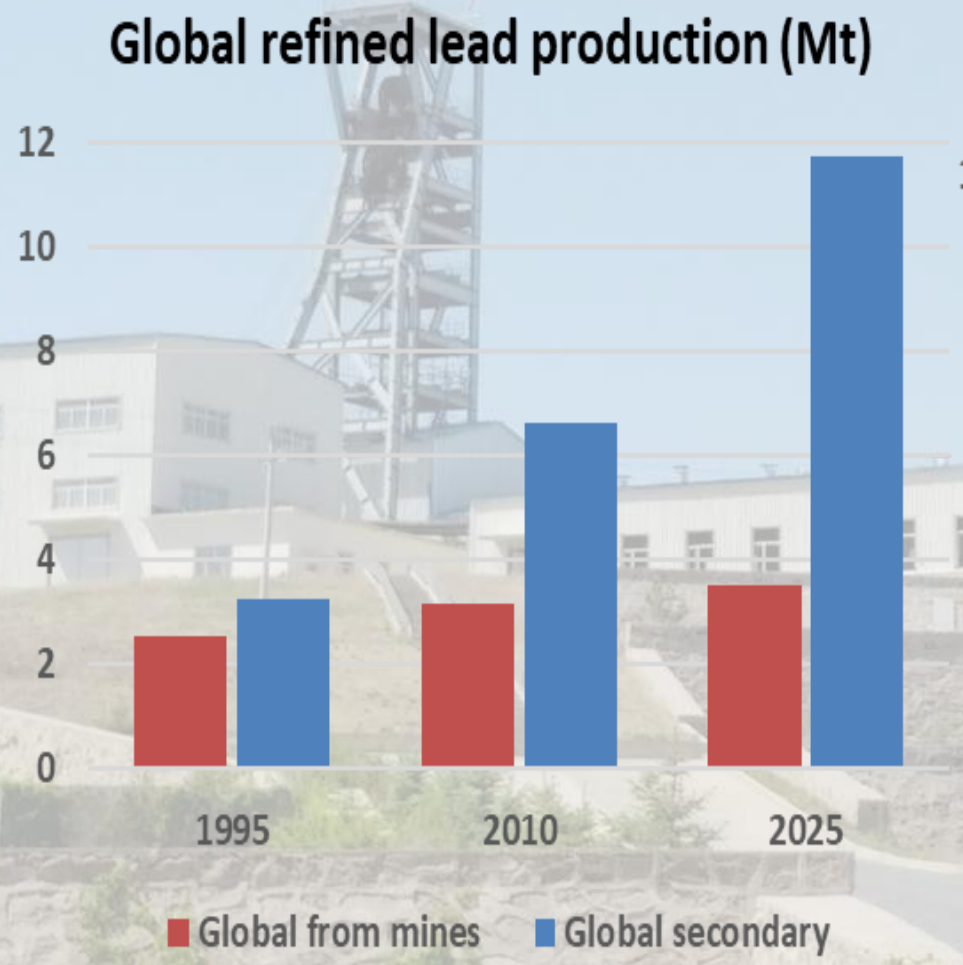
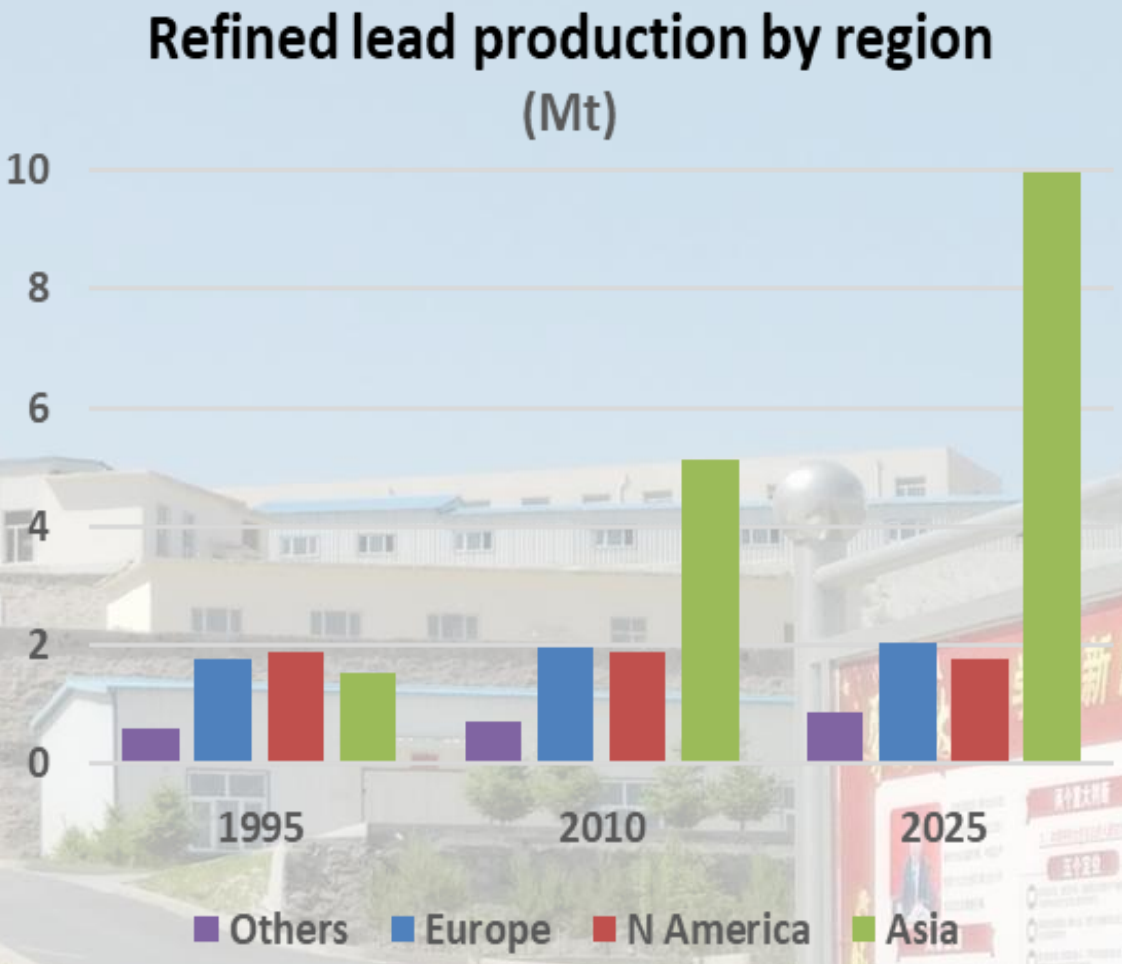
How and where lead is produced is changing





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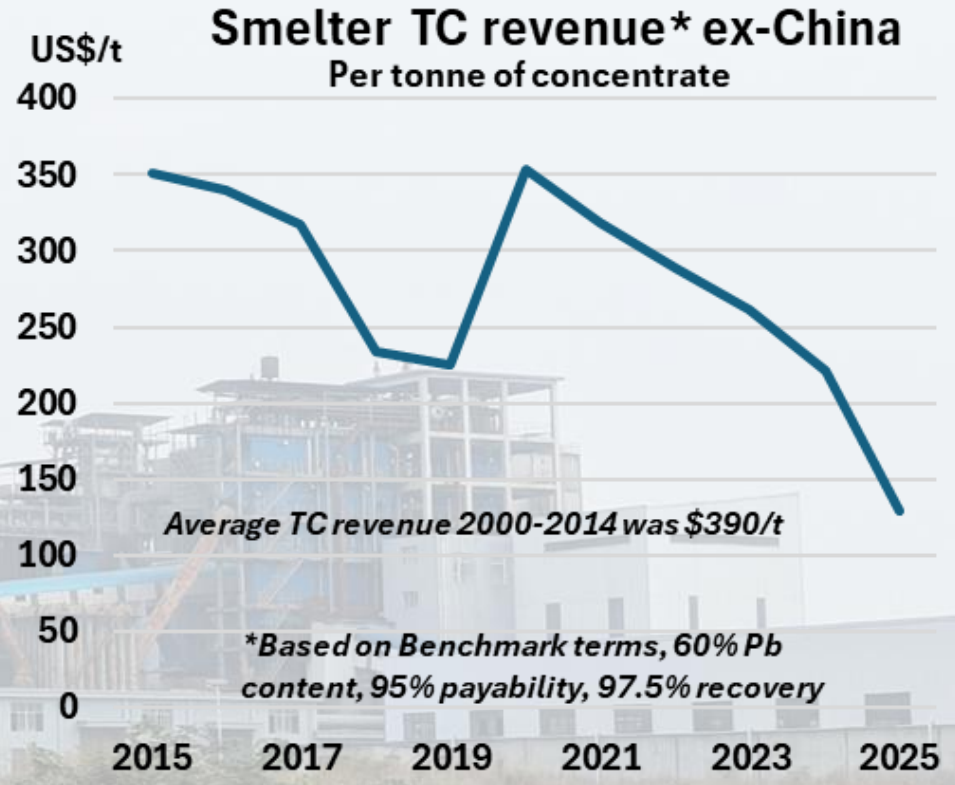
Challenge for primary producers

- Treatment charges!
- Treatment charges (TCs) for concentrate reflect the balance between mine supply and smelter demand for feed
- Lead concentrate market has been "tight" since 2020 with limited increase in global mine production while smelter production in China has increased but declined outside China
- Reckless competition for feed has driven down smelter revenues to the extent that few are now viable as stand-alone operations



- Smelters earn additional revenue from silver refining, by-products and metal sales premia

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Primary smelters in China

- Treatment charges in China have been driven lower by intense competition
- Process capacity far exceeds availability of feed
- Many smelters have invested in equipment to improve recovery of by-products
- Increasing revenue from these by-product streams but at the expense of ever-lower TCs
- To make up domestic shortfall in mine supply Chinese smelters import almost 1.2Mt/a Pb in concentrate – driving down TCs for all smelters
- This is now risking the viability of remaining primary lead smelters ex-China

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Preserving primary lead production ex-China

- Primary lead smelters play an important role in processing lead concentrates, but also a wide variety of lead-bearing secondary materials
- Several of the remaining smelters ex-China now operate as integrated units in tandem with zinc smelting treating zinc leach residues to produce an inert slag
- Lead smelters are key for the production of critical by-product metals such as antimony and bismuth as well as silver
- Supplies of these critical materials are at risk with China being the dominant producer
- Governments are beginning recognise that primary lead smelting is at risk of being eliminated ex-China due to irrationally low TCs
- Australian government has stepped in to fund key investments at Nyrstar's Port Pirie and Hobart operations
- More needs to be done to secure future of primary lead smelting in those few countries that still have these operations

"Nyrstar to get $135 million bailout for struggling smelters"

August 5 2025

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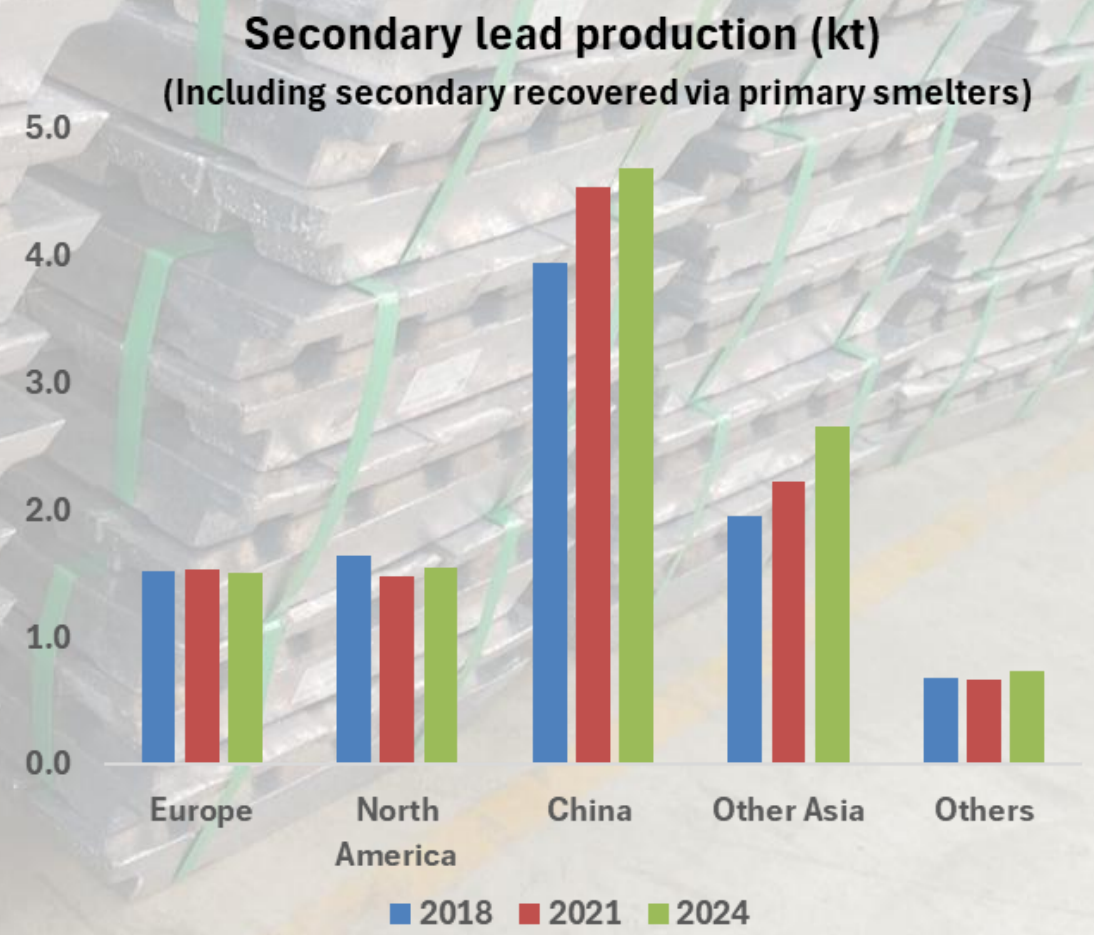
Secondary lead production – battery recycling – not facing the same threats as primary producers

- Key factors helping to sustain order in global secondary lead production are the Basel Convention covering the transborder shipment of hazardous waste and China's ban on lead battery scrap imports
- Within its domestic market China faces a massive surplus of capacity to process lead battery scrap
- Scrap prices are very high, and it is likely that the whole industry is losing money with utilisation rates very low



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International trade in battery and lead scrap is shifting secondary lead production to Asia

- Korea and now India have emerged as large-scale importers of battery and lead scrap complementing their domestic supplies of battery scrap
- North America a key source of this scrap reducing supplies to recycling operations in the USA and Mexico
- More difficult to track are flows of battery scrap into Middle East for initial processing and likely onward sale
- South Asian countries other than India also seeing growing recovery of secondary lead

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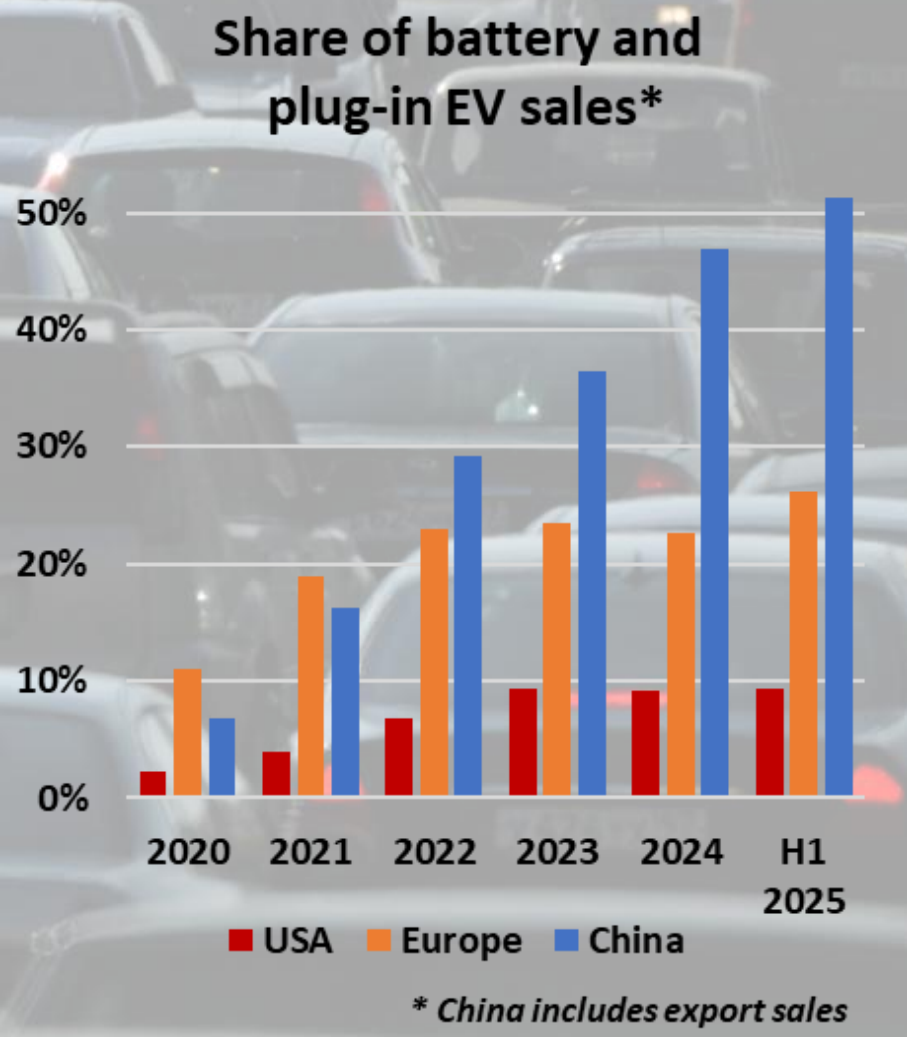
Electric vehicles pose existential threat to automotive lead battery industry

- Sales of battery electric and plug-in hybrid vehicles (NEVs) now more than 50% for China's auto manufacturers
- Sales slower than forecast elsewhere
- In China sales of OE SLI lead batteries peaked almost 10 years ago
- Total SLI sales in China likely to peak in next few years and then decline
- Auxiliary batteries (low voltage) also at risk due to substitution by lithium
- Global market for SLI batteries is forecast to expand through to 2030 but at much slower pace than in the past
- Many makers of lead batteries are investing in lithium battery capability



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Opportunities

- Significant opportunities available for lead batteries in power backup, storage and motive power applications
- Roll out of data centres (cloud-based computing, AI, etc) offers a huge and expanding market for back-up power installations
- With a few exceptions, lithium batteries dominate this sector
- There appears to be mis-information about the performance of lead batteries, especially life-cycle, which is often unchallenged
- Motive power in traditional applications is also under threat from lithium
- Significant market for lead batteries in mobility remains under-exploited in many countries, with the exception of China

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Risks

- Energy storage is essential to enable and power global electrification of industry, heating and transportation
- As the oldest, rechargeable battery chemistry, with over a century and a half of development, abundant raw materials and global recycling infrastructure, lead batteries should be in a strong position to benefit from the surge in demand for renewable energy and storage
- Are alternative battery chemistries simply better and more appropriate for today's new applications?
- Are forecasts of an extended, slow decline in lead battery use too optimistic?
- Will Chinese auto makers, many new to the industry, switch rapidly to lithium batteries for low voltage applications, forcing all to follow suit?
- Lead producers and consumers must do more to encourage use of lead batteries in all appropriate applications – this is no time for complacency!

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- Providing independent, detailed analysis and forecasts of global lead and zinc industries
- Covering all aspects of mine and smelter supply and end-use consumption
- Data from original sources wherever possible
- A particular focus on Chinese market
- Offices in the UK and Xi'an
- Clients include producers, consumers, traders and hedge funds

For more information please contact Huw.Roberts@chrmetals.com

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