Consolidation in the lithium industry, the Good, the Bad, and the Ugly

By Kenneth Hoffman, CFA, CIM Founder and CEO Traubenbach

The growth in the lithium industry will continue to be among the largest opportunities for the mining/chemical industry for the next decade plus. Global capacity, not production, of the battery industry reached approximately 3TWh in 2024, and could approach 20 TWh in a decade. Lithium, as the technology stands today, has responded to pressures from competing battery chemistries to be best in class, with prices of LFP cells falling below $40 per kWh. We ate Traubenbach, believe any new battery chemistry should target a $20 per kWh price point in order to be long term competitive.

The decline in battery costs means that the opportunity set for battery technology has expanded exponentially. Pack design changes which add 50% to as much as 100% of energy density in the pack means up to double the amount of metals needed per pack. The combination of much larger pack sizes as well as a fast-growing market means exponential growth in overall metal demand.

Understanding that battery cell chemistries can change at a rapid pace, making all analysis mute, we look at the near to mid-term battery chemistries, nearly all of which depend upon lithium in one way or another. The form of lithium, lithium chloride, lithium carbonate, lithium hydroxide, lithium metal, etc will change in proportion to each other depending upon which chemistries provide the best solution to market demands. Therefore, Traubenbach estimates that by the mid 2030's. lithium demand on an LCE basis could approach 6 million mt to 10 million mt on an LCE basis, depending upon the share of the market lithium products retain. With a long-term price forecast of $15,000 per mt LCE, and adding value adding services to the base underlying lithium product, the industry could see annual revenues of between $150-$250 billion by the mid 2030's.

Such a large size market will bring in larger companies, whose ability to size and scale massive production efforts at the lowest cost. The question will be, what will make a larger company, entering a rapidly changing production technology market successful? We believe that these will be some of the milestones necessary to become a global winner in the lithium market:

1. Acquire only world class assets
2. Clean sheet new technologies and forget the past
3. Build partnerships up and down the value chain
4. Be open to differentiated ideas, and do not be afraid to be unconventional
5. Run producing assets that can operate in all pricing environments

6. Choose your pricing regime carefully, ignoring short term pressures for value maximization.
7. Refused to be married to technologies of the past if new technologies present themselves as game changing.
8. Understand the entirety of the lithium battery value chain, from production to each battery chemistry, from mine to the final OEM.

- **Acquire only world-class assets**

  - Focus on assets with high-grade lithium deposits, low-cost extraction potential, and proximity to infrastructure.
  - Consider geopolitical stability and regulatory environment to avoid disruptions.
  - Prioritize sustainability, ensuring compliance with ESG (Environmental, Social, and Governance) standards to maintain social license to operate.

- **Clean sheet new technologies and forget the past**

  - Invest in R&D for direct lithium extraction (DLE) and advanced refining techniques to improve recovery rates and reduce costs.
  - Move away from outdated or inefficient mining and processing methods that could become obsolete in the next decade.
  - Collaborate with battery manufacturers and research institutions to stay ahead of technological breakthroughs.
  - Make investments in 3-5 up and coming DLE technologies, these should range from large pilot plants to in the lab, but game changing technologies. Contracts should state you have access to early pilot and commercial plants.

- **Build partnerships up and down the value chain**

  - Secure long-term supply agreements with automakers and battery manufacturers to ensure demand stability.
  - Engage with chemical processing companies to develop high-purity lithium compounds tailored for various applications.
  - Work with governments and local communities to secure mining permits, infrastructure, and workforce development.

- **Be open to differentiated ideas, and do not be afraid to be unconventional**

  - Explore how new production technologies change costs dynamics.
  - Go back and look at brine reservoirs to make sure that PPM calculations, some completed decades ago, and when the process was looking for oil and gas as the main target, not the difficult to accurately delineate, lithium molecule, has been researched.

- Consider vertical integration to gain more control over refining and battery production.
- Evaluate non-traditional business models such financing operations with streaming agreements via royalty companies.

- **Run producing assets that can operate in all pricing environments**

  - Implement flexible cost structures to maintain profitability even during lithium price downturns.
  - Optimize operations for efficiency through automation, AI-driven predictive maintenance, and energy-efficient practices.
  - Diversify revenue streams by adding value-added products such as lithium metal or specialized battery materials.

- **Choose your pricing regime carefully, ignoring short-term pressures for value maximization**

  - Avoid selling into the spot market during price peaks—focus on long-term contracts to ensure steady revenue.
  - Evaluate different pricing models such as cost-plus agreements or index-based pricing to hedge against volatility.
  - Consider partnerships with automakers that include floor-price guarantees in exchange for supply security.

- **Refuse to be married to technologies of the past if new technologies present themselves as game-changing**

  - Continuously evaluate emerging battery chemistries and their impact on lithium demand (e.g., solid-state batteries).
  - Stay ahead of regulatory changes that may push the industry toward more sustainable lithium extraction and processing methods.
  - Allocate capital towards pilot projects testing next-generation lithium processing or recycling technologies.

8) Understand the entirety of the lithium battery value chain, from production to each battery chemistry, from mine to the final OEM.

- **Mining & Extraction:** Know the differences between spodumene hard rock mining, brine extraction economics, and how emerging technologies like direct lithium extraction (DLE) can change this calculus. Each has different cost structures, lead times, and scalability.
- **Processing & Refining:** Lithium is processed into different forms (lithium carbonate, lithium hydroxide, lithium chloride, and lithium metal), each suited for

specific battery chemistries. Understanding conversion processes and refining bottlenecks is crucial.

- **Battery Chemistry Trends:** Track innovations in lithium-iron-phosphate (LFP), LMFP, nickel-manganese-cobalt (NMC), semi-solid and solid-state batteries, cathodes that use different metals such as vanadium and emerging chemistries to anticipate shifts in demand for different lithium compounds.
- **Battery Manufacturing:** Learn how lithium integrates into cathodes, anodes, electrolytes, and other components to ensure optimal performance, longevity, and cost-effectiveness in final battery products.
- **Supply Chain Risks & Logistics:** Be aware of bottlenecks such as refining capacity concentration (especially in China), geopolitical risks, and transportation challenges that can impact pricing and availability.
- **OEM Relationships:** Automakers (OEMs) and energy storage companies are increasingly securing direct lithium supply deals. Understanding their needs, sustainability requirements, and production timelines is key to strategic positioning.
- **Recycling & Circular Economy:** Lithium-ion battery recycling is becoming a major factor in long-term supply security. Companies that integrate recycled lithium into their business model will have a competitive advantage in sustainability and cost reduction.

There is no doubt that massive industry consolidation will occur in the rapidly evolving lithium industry. There is also little doubt that some of the acquisitions will go well, while others will be a shareholder regret. Understanding the entirety of the lithium value chain, from production of products through to its final.

For more information, please contact Ken Hoffman, CFA, CIM or Traubenbach, we advise a small number of world class companies in navigating the lithium and critical metals industries. kenhoffman@traubenbach.com