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www.indrastra.com | ISSN 2381-3652

Southeast Asia Battery Industry Trends: Examining Market Dynamics and Manufacturing Scope

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Presently, two prominent battery technologies are dominating the market: Nickel Manganese Cobalt (NMC) and Lithium Iron Phosphate (LFP). Southeast Asia is well-positioned to cultivate a battery ecosystem centered on NMC technology due to the region's abundant nickel reserves, which constitute approximately 25% of global reserves and serve as the primary raw material for NMC batteries. Indonesia, in particular, boasts the largest share of nickel reserves in Southeast Asia, accounting for roughly 21% of global reserves, making it a lovely prospect for developing an NMC-focused battery ecosystem. Furthermore, there has been substantial commitment from international stakeholders to invest in establishing a local battery value chain, totaling $15 billion in investments to date, coupled with robust government support. Indonesia's Ministry of State-Owned Enterprises (BUMN) has expressed its ambition to achieve a domestic production capacity of 140 GWh by 2030 (as illustrated in Exhibit 2).

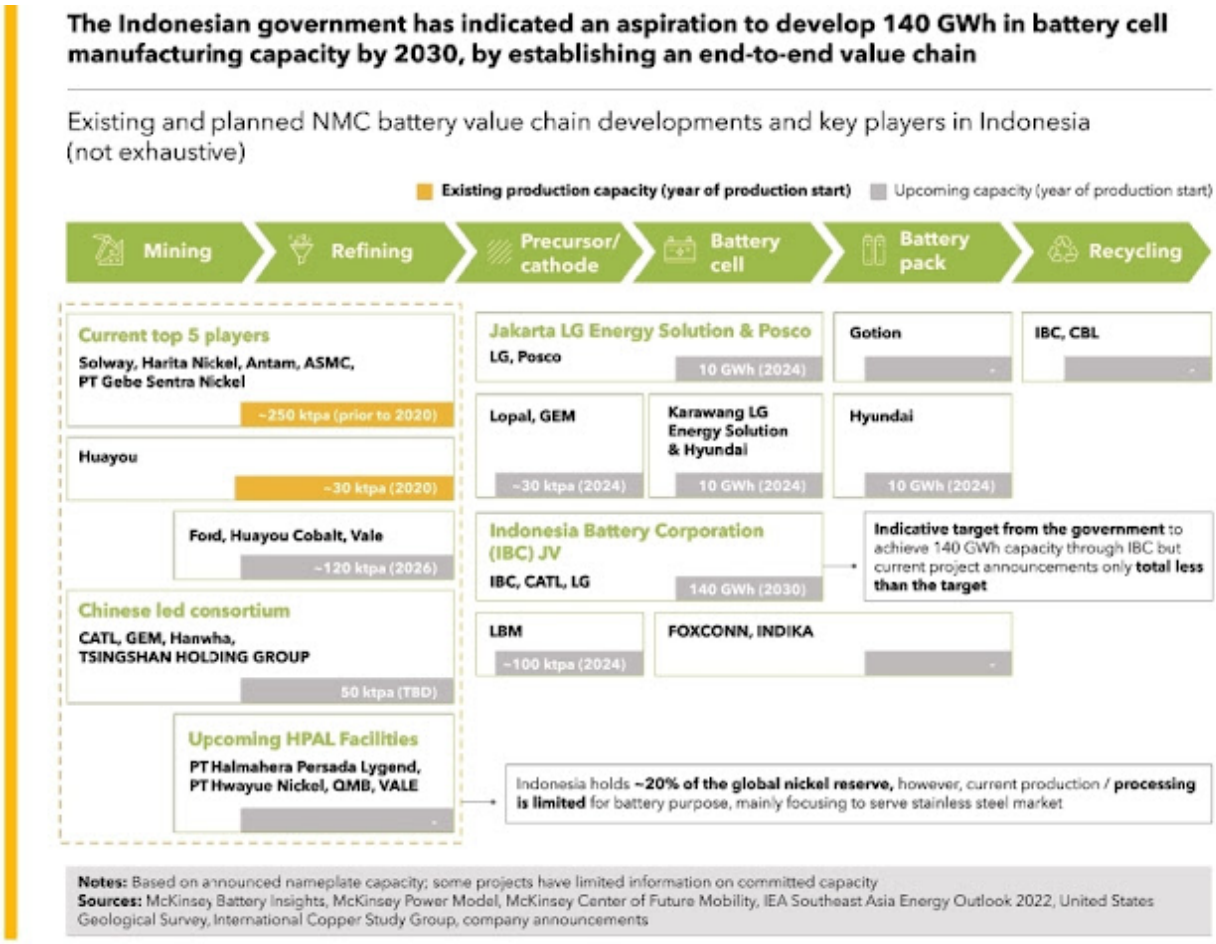

Exhibit 2

Demand Forecast

The demand for battery manufacturing output from Southeast Asia is poised to be primarily driven by exports to other regions, notably the US and Europe, despite the growing regional demand for batteries. This trend is underpinned by the current trajectory of global battery demand, which is forecasted to surge by approximately 25% annually, reaching a staggering 4.5 terawatt-hours (TWh) by 2030. Within the global battery market, Nickel Manganese Cobalt (NMC) technology currently commands more than half of the total demand. It is expected to maintain its growth momentum at an estimated rate of around 20% per annum (as indicated in Exhibit 3).

While Southeast Asia's contribution to the global battery market is projected to remain relatively modest, constituting less than 5% in the forthcoming decades, the region is anticipated to witness remarkable growth in absolute demand. Forecasts suggest Southeast Asia's demand for batteries will experience an impressive annual growth rate of over 40% until 2030, ultimately reaching a capacity of approximately 75-80 gigawatt-hours (GWh). This demand surge is expected to double in the next five years, reaching 150-175 GWh by 2035 (as detailed in Exhibit 3).

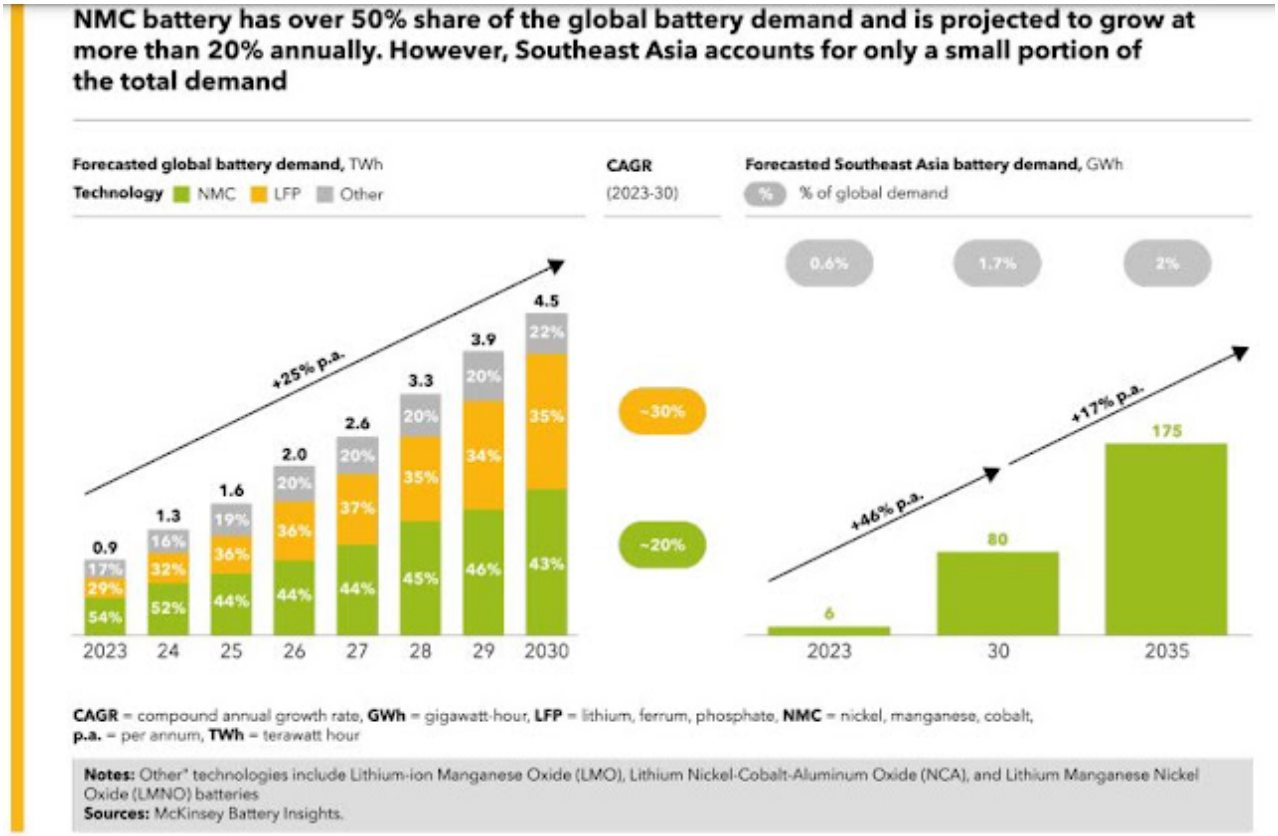

Exhibit 3

In essence, Southeast Asia may not dominate the global market share. Still, it is poised for substantial expansion, positioning itself as a significant player in the evolving battery industry landscape, fueled by regional and international demand.

Battery demand in Southeast Asia primarily stems from two key segments: electric vehicle (EV) batteries and battery energy storage systems (BESS). In certain nations such as Indonesia, Thailand, and Vietnam, the surge in EV adoption serves as the principal catalyst for the increased demand for batteries. This trend is attributed to robust vehicle demand and the promising prospects for vehicle electrification in these regions.

Conversely, in countries like Malaysia and the Philippines, the demand for batteries is predominantly propelled by the adoption of battery energy storage systems. This preference is driven by a more competitive levelized cost of storage (LCOS) (as illustrated in Exhibit 4) in these countries. These favorable cost dynamics are owed to the considerable potential for renewable energy utilization and the comparatively higher electricity costs from the grid in these nations.

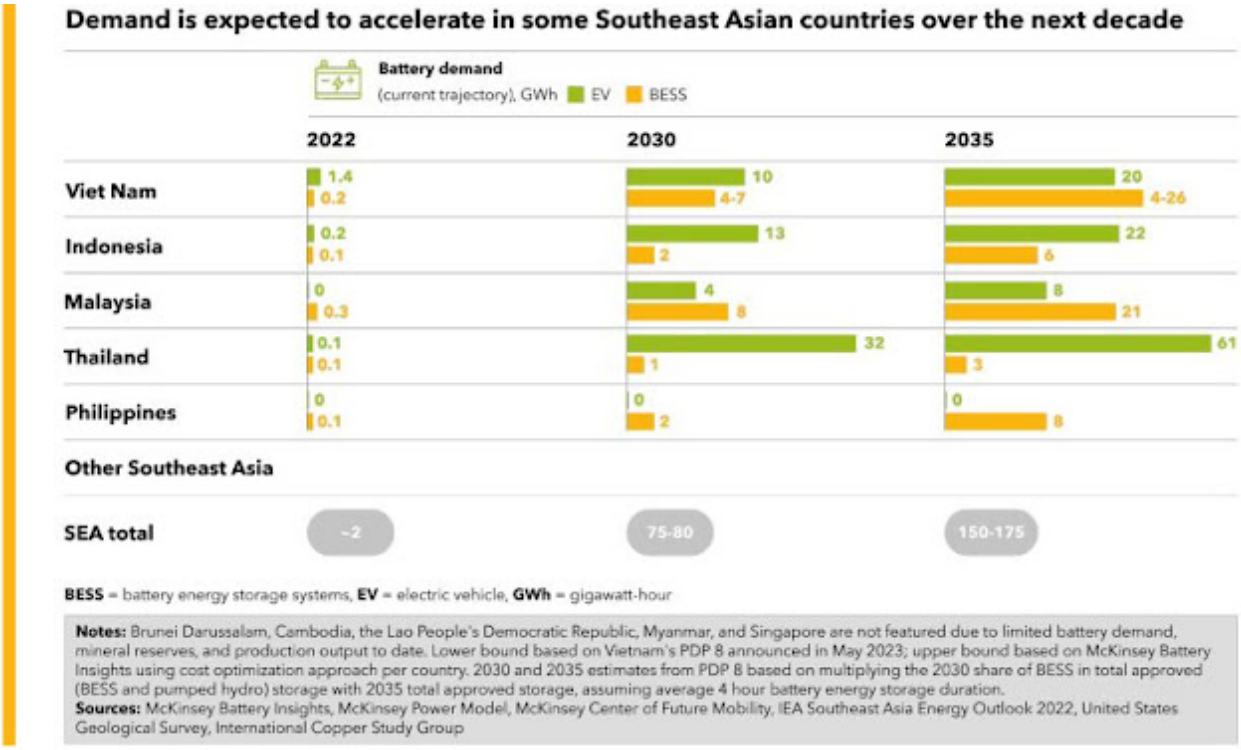

Exhibit 4

To fully realize or surpass the domestic demand potential in these countries, five essential factors must be established:

1. A robust commitment to the electrification of vehicles.
2. Compared to fossil fuel-based energy sources, competitiveness in Levelized Cost of Storage (LCOS).
3. Stability in commodity prices is required for battery raw materials.
4. Advancements in technology that support the growth of the domestic value chain, including enhancing the cost competitiveness of NMC technology relative to LFP technology, as well as developing expertise in refining and battery cell manufacturing.
5. Implementation of policies aimed at promoting battery manufacturing.

Indonesia stands out among Southeast Asian nations as exceptionally well-positioned to capitalize on several favorable factors for expanding its domestic market. These factors include supportive policies for vehicle electrification, such as a national target for transitioning all two-wheelers to electric models by 2040. Additionally, the country benefits

from a stable outlook on commodity prices, particularly class 1 nickel used in battery applications, and favorable policies designed to incentivize manufacturing, such as tax benefits for the construction of battery manufacturing facilities.

Moreover, Indonesia has the potential to unlock further growth in demand by addressing specific barriers. This includes enhancing the competitiveness of Levelized Cost of Storage (LCOS) to stimulate demand for Battery Energy Storage Systems (BESS) and ensuring the scalability of refining and cell manufacturing technologies (as depicted in Exhibit 5).

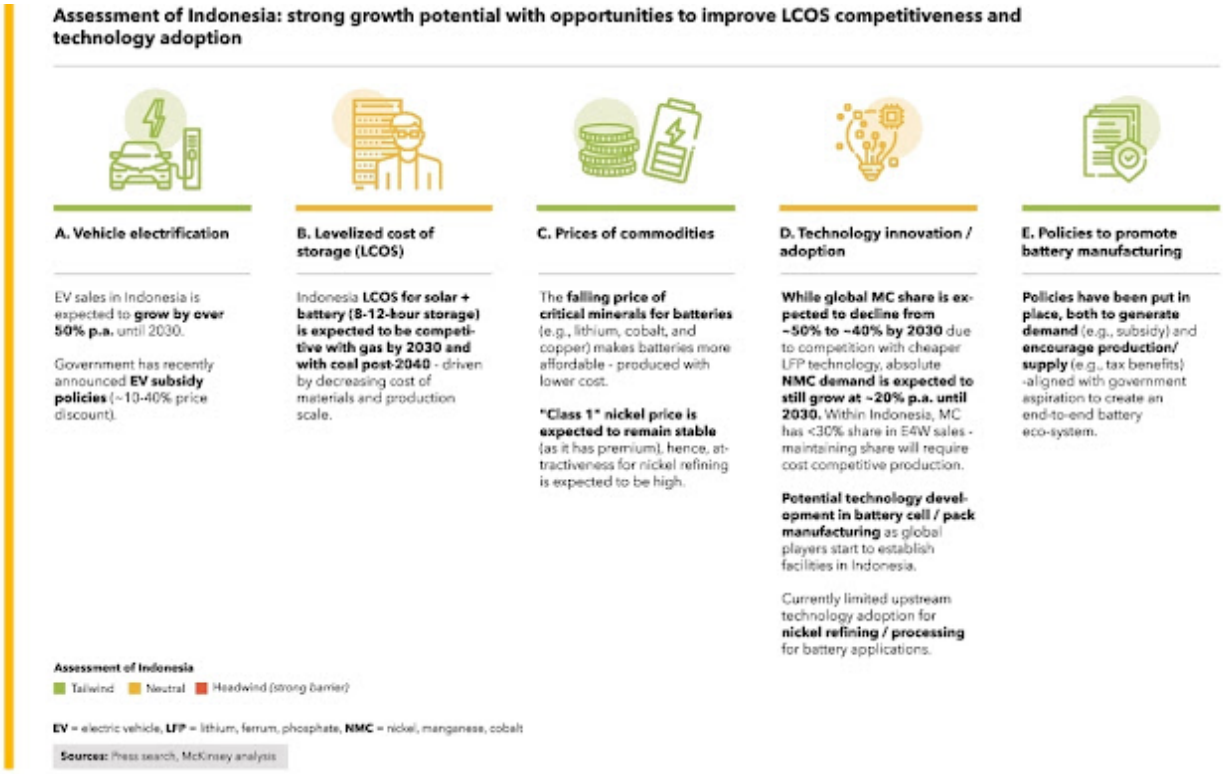

Exhibit 5

Cost Competitiveness

To promote growth in the Southeast Asian battery industry, it is essential to target global export markets significantly since the domestic market is expanding from a relatively minor base. Additionally, battery manufacturing countries in Southeast Asia should focus on maintaining cost competitiveness to effectively compete with other global manufacturers. This is crucial because customers, such as electric vehicle (EV) original equipment manufacturers (OEMs), place significant emphasis on price when making purchasing decisions.

The cost competitiveness of battery manufacturers is primarily influenced by four key factors:

Vertical integration and access to low-cost raw materials: Raw materials constitute approximately 40% of the total cell production cost. Consequently, major cell manufacturers like CATL, Panasonic, and LG Chem have pursued vertical integration upstream, including involvement in mining and refining, to secure access to these materials.

The scale of production: Manufacturing at sub-scale volumes, meaning below 10 gigawatt-hours (GWh), can be less competitive due to the higher labor and energy costs involved. Larger production scales significantly enhance cost competitiveness, often by approximately 20%.

Production yield: In the initial years of operation, battery manufacturers usually experience low yields, typically 20% to 30%. It is imperative to expedite the learning curve to achieve stable production with yields exceeding 90% within four years or less, aligning with benchmarks set by leading manufacturers, particularly in the People's Republic of China (PRC).

Proximity to or bulk contracts with equipment and technology/electronics suppliers: Being close to equipment and technology/electronics suppliers or having bulk contracts with them can result in cost savings on capital expenditures (CAPEX) and the raw materials utilized in battery cell production.

Indonesia serves as an instructive case in point (as depicted in Exhibit 6). The cost analysis for Indonesia is based on the assumption of a fully integrated value chain and large-scale production, aligning with the ambitious goal of the Indonesian government to achieve 140 gigawatt-hours (GWh) of production by 2030. However, more is needed for Indonesia to achieve economic competitiveness compared to leading global battery manufacturers, such as those in the People's Republic of China (PRC), as the overall costs are estimated to remain 5% to 10% higher. To bridge this cost differential, strategies need to be devised to address the third and fourth key factors mentioned earlier, which encompass expediting the learning curve of operations to enhance production yield and reducing capital expenditures (CAPEX) related to property, plant, and equipment (PP&E).

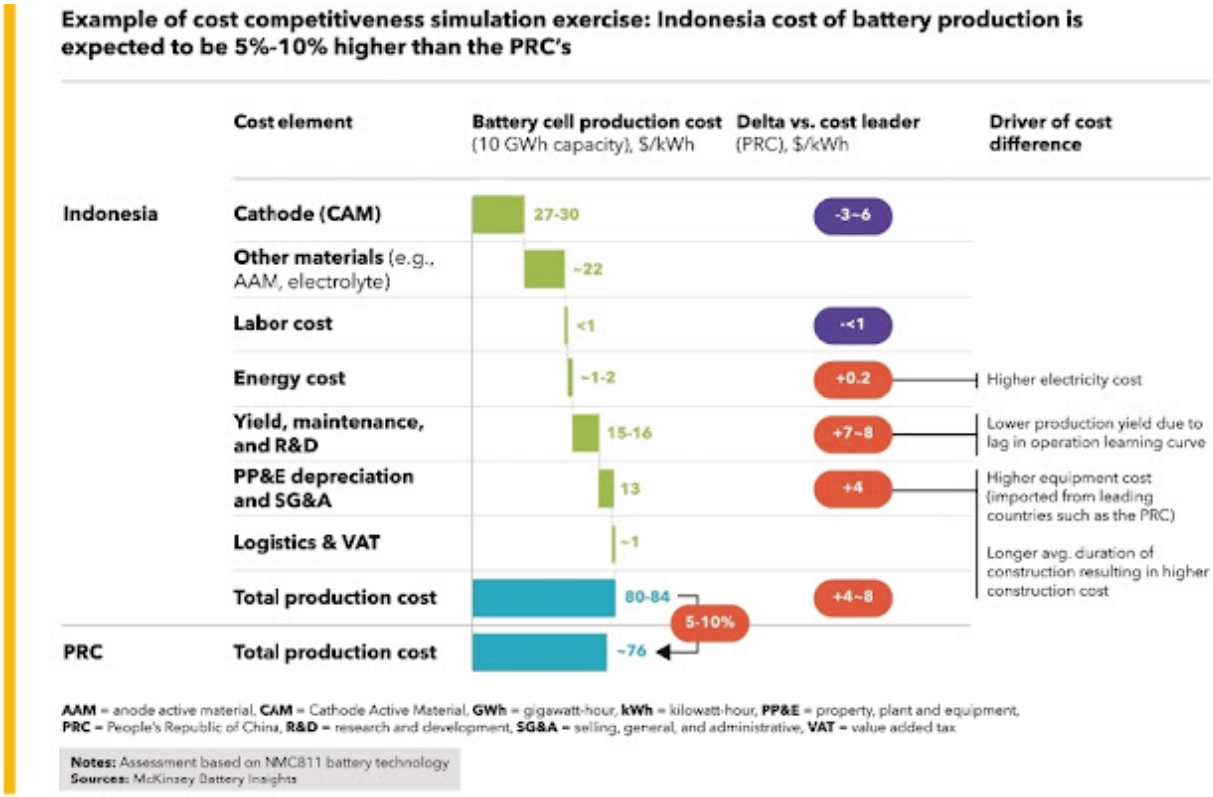

Exhibit 6

Expediting the learning curve is of paramount importance as it is anticipated to bring Indonesia's battery cell manufacturing costs in line with or below the production costs of the leading benchmark country, the PRC. This necessitates learning from experienced industry players and implementing top-notch operational systems. Successful battery companies have formed partnerships with experienced manufacturers, allowing them to adopt and expand their expertise by bringing in skilled workforces. Furthermore, since different factories may employ varying setups and specific processes, it is also crucial to establish an operational framework that fosters rapid and continuous learning. This can be achieved through rigorous due diligence and capabilities for root cause analysis.