ENERGY TRANSITION PARTNERSHIP

REPORT

VIETNAM'S BATTERY SUPPLY CHAIN: CURRENT STATE ANALYSIS AND INVESTMENT OPPORTUNITIES

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Executive summary

Vietnam is entering a pivotal stage in its economic development and energy transition. The country now has a unique opportunity to position itself as a regional hub in the lithium-ion battery (LIB) supply chain, contributing significantly to its national net-zero emissions target by 2050 and responding to an anticipated 70% global battery undersupply by 2035.

The ***Enhancing Batteries' Supply Chain for Electric Vehicles, Energy Storage Systems, and Renewable Energy initiative,*** a collaboration between Vietnam's Ministry of Finance and the Southeast Asia Energy Transition Partnership (ETP) – United Nations Office for Project Services (UNOPS), focuses on promoting investment, bolstering innovation, and providing policy recommendations to strengthen Vietnam's position in the battery supply chain.

This report is the fourth deliverable under the scope of the collaboration. It provides a **comprehensive analysis of Vietnam's battery supply chain, evaluating its current state, identifying opportunities and challenges, and proposing strategic interventions** to enhance technological capabilities, attract investment, and build a sustainable ecosystem. The analysis is grounded in a wide range of data sources—including primary interviews and focus groups with industry stakeholders and governmental entities, global benchmarks from the International Energy Agency (IEA) and BloombergNEF, and Vietnam's evolving national policy frameworks.

Based on this analysis, Vietnam's domestic battery demand is projected to reach 46.9 GWh by 2030. This demand is expected to be driven by the uptake of approximately 1.55 million electric two-wheelers (E-2Ws), 171,000 passenger electric vehicles (PEVs), and deployment of 10,000 megawatts (MW) of battery energy storage systems (BESS). To meet this projected demand, Vietnam will require an investment ranging between $3.28 billion and $5.39 billion, depending on the pace of global battery cost reductions—from $115/kWh to a potential $70/kWh by 2030. This scale of investment presents a transformative opportunity for economic diversification, job creation (estimated at 28,750 to 35,000 new jobs), and enhanced national energy security.

Strategic Positioning and Market Opportunity

Vietnam is strategically positioned to become a competitive player in the global battery market, which is forecasted to grow at a 21% compound annual growth rate (CAGR) and reach 3,500 GWh of global demand by 2030 (IEA, 2023).

The country has several competitive advantages:

- **Significant mineral reserves:** including an estimated 3.7 million tons of nickel in Son La, untapped graphite deposits in Yen Bai and Tuyen Quang, and potential rare earth elements, which are essential inputs for battery production. The amount of manganese is also moderate at 10.77 million tons.
- **Supportive policies:** such as the National Green Growth Strategy supporting innovating and greening the industrial supply chain, Action Program on Green Energy Transition, Reduction of Carbon and Methane Emissions in the Transport Sector to develop green transportation system, Law on Geology and Minerals (2024) and Decision No. 866/QD-TTg (2021), which provide regulatory backing for mineral exploration and processing, etc.

- **Cost advantages:** Vietnam's average labor costs are $296.5/month, significantly lower than China's $430/month (ILO, 2025), and electricity rates are competitively priced at $0.085/kWh (Vietnam Electricity, 2025). This offers a cost advantage for energy-intensive segments of the battery supply chain. However, this rate is currently below EVN's cost-recovery level, and future adjustments may be required to reflect financial sustainability and the growing share of renewable energy. Investors should assess long-term electricity cost risks in project viability assessments.
- These factors translate to a landed battery cost of $73–$86/kWh, making **Vietnam competitive in key export markets such as ASEAN, Europe, the United States, and India.**

Vietnam is also **deeply integrated into a wide network of free trade agreements (FTAs),** including the EU-Vietnam Free Trade Agreement (EVFTA), Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), and the Regional Comprehensive Economic Partnership (RCEP). These agreements provide tariff-free market access, facilitate technology transfer, and encourage cross-border collaboration.

Private sector partnerships with global firms such as Gotion High-Tech (China), ProLogium (Taiwan), and Contemporary Amperex Technology Co. Ltd. (CATL, China)—as well as collaborations with regional players like Thailand and Indonesia—are enhancing Vietnam's supply chain resilience and technological know-how.

Domestically, government targets are driving demand. These include:

- 30% adoption of electric cars and 22% adoption of electric motorbikes by 2030
- Deployment of 10,000–16,300 MW of BESS capacity as outlined in the Revised Power Development Plan VIII (PDP8)

This policy direction is **aligned with global policy trends**, such as the U.S. Inflation Reduction Act (IRA), which offers $35/kWh in tax credits for battery manufacturing. Although the IRA has driven significant investment, its long-term implementation faces political and fiscal uncertainties. Similarly, the EU Green Deal Industrial Plan reinforces the shift toward clean supply chains by mandating carbon footprint tracking for battery products.

Economic and Social Benefits of a Domestic Battery Supply Chain

The estimated investment requirement for developing Vietnam's domestic battery supply chain ranges from **$3.28 billion to $5.39 billion**, depending on global battery cost trends by 2030. This range is based on our projections under three battery pack price scenarios:

- $5.39 billion at $115/kWh
- $4.22 billion at $90/kWh
- $3.28 billion at $70/kWh

These scenarios reflect global cost drivers, including:

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- Economies of scale
- Improved manufacturing efficiencies
- Wider adoption of lithium iron phosphate battery chemistries, which are cheaper and safer alternatives to nickel-based chemistries

Of the total projected domestic battery demand (46.9 GWh):

- 64% will be attributed to BESS (30,000 MWh), representing the largest investment opportunity
- Electric two-wheelers (5,425 MWh) support mass-market penetration
- Passenger EVs (11,486 MWh) create opportunities for high-value manufacturing and exports

Job creation is a major benefit of supply chain development. As an example, the VinES plant in Ha Tinh currently employs 1,000 workers for 5 GWh production capacity, or approximately 200 workers per GWh. Scaling up to 10.743 GWh could employ 1,396 workers, and meeting 46.911 GWh nationally could generate 28,750–35,000 jobs, with an estimated 25% being high-skilled roles. This supports economic diversification, especially in rural and industrial zones transitioning away from traditional labor-intensive sectors.

There is also significant trade and export potential, with battery and EV exports projected to reach $2 billion by 2032. Additional value is added through localized production of cathodes, anodes, and battery packs, reducing import costs and contributing to GDP growth, while elevating Vietnam as a high-tech manufacturing hub in Southeast Asia.

Challenges and Gaps

Despite these opportunities, Vietnam's battery industry faces several structural and operational challenges:

- **The battery supply chain remains underdeveloped.** There is still high import dependency for critical materials such as lithium and cathodes. Only 15% of nickel ore is processed into nickel sulfate, and battery recycling rates (8–12%) remain far below best-practice benchmarks like Japan's 95% target.
- **Charging infrastructure is limited—especially in rural areas—**with EV models like VinFast offering only 300 km range and fast-charging times of 30–60 minutes, which could limit broader adoption without network upgrades.
- **High upfront EV costs remain a barrier**, especially given Vietnam's GDP per capita of 4,282.09 USD according to the World Bank.
- **The technical workforce is insufficient,** with less than 10% of engineers trained in battery-relevant fields. Investment in R&D is minimal at 0.5% of GDP, constraining local innovation and technological advancement.
- **Policy gaps persist:** Vietnam lacks a national battery industry roadmap, specific production subsidies, and robust recycling mandates. These factors have contributed to

lost investment opportunities, such as Intel's $3.3 billion investment shift to Poland and LG Chem's move to Indonesia.

International competition is intensifying. China dominates 60% of cathode production (IEA, 2024), while Indonesia controls 24% of global nickel reserves and has already attracted $21 billion in foreign direct investment into its battery sector (World Bank, 2024).

Geopolitical risks—including recent 40% lithium price spikes due to US-China tensions—highlight the importance of diversified and stable supply chains. Additionally, challenges within Vietnam's renewable energy sector—such as tariff uncertainty and grid curtailment risks—undermine the viability of BESS, thereby impacting the battery supply chain's overall growth.

Policy and Partnership Framework

Vietnam has laid foundational policy instruments to support battery sector development. These include:

- The National Green Growth Strategy (2012, updated 2021)
- The Investment Law (2020)
- Decision No. 876/QD-TTg (2022), which targets a net-zero transport sector by 2050
- Decision No. 768/QD-TTg (2025), which highlights the installed capacity for battery energy storage system to be 10,000 – 16,300 MW.

Incentives such as 0% import tax on EV components (Decree No. 26/2023/ND-CP) and registration fee exemptions (Decree No. 51/2025/ND-CP) have helped stimulate downstream EV demand. However, more targeted incentives for battery production—particularly at the midstream and upstream levels—are still lacking.

Notable partnerships are helping close some gaps:

- VinFast's collaboration with Gotion High-Tech supports the development of a 5 GWh/year LFP battery plant
- Regional partnerships, such as those with Indonesia, help secure nickel supply chains
- Free trade agreements continue to expand export potential and international integration

Recommendations for Action

To fully realize its battery sector potential, Vietnam must adopt a multi-dimensional strategy:

1. **Develop a National Battery Roadmap**
   Formulate a detailed national strategy, with integrated targets across upstream (raw materials), midstream (processing), and downstream (manufacturing). Introduce targeted production incentives—such as $10/kWh subsidies—based on best practices from the U.S. IRA and China's subsidy model.

2. **Invest in Localization**
   Support the establishment of LFP battery gigafactories (10–15 GWh capacity) and scale up nickel and graphite refining (e.g., in Ban Phuc and Dak Nong) to reduce import dependency by 80%, leveraging incentives under Decree 182/2024/ND-CP.

3. **Enhance Infrastructure**
   Expand the national EV charging network, targeting 10,000 stations by 2030, with a focus on rural coverage (60%). Develop battery industrial zones with renewable energy-powered infrastructure, modeled after Indonesia's Sulawesi Industrial Park.

4. **Upskill the Workforce**
   Establish specialized training centers through partnerships. Aim to train high-skilled engineers in fields such as battery chemistry, recycling, and digital systems, addressing the current 90% technical skill gap.

5. **Secure Strategic Partnerships**
   Foster joint ventures with global leaders (e.g., CATL, LG Chem, Tesla) for technology transfer, and launch an ASEAN Battery Alliance to coordinate regional supply chains. Secure long-term raw material deals, such as 50,000 tons/year of nickel from Indonesia.

6. **Promote Sustainability**
   Require that 50% of battery production energy comes from renewable sources by 2030. Introduce battery passports in line with EU regulation for carbon footprint tracking, and invest in hydro-metallurgical recycling facilities to achieve 70% lithium recovery by 2035.

Conclusion

Vietnam's development of a domestic battery supply chain represents a strategic opportunity to achieve energy independence, stimulate economic development, and contribute to the global clean energy transition. With an estimated $3.28–$5.39 billion investment, Vietnam can capture 1.3% of global market share, create tens of thousands of new jobs, and significantly reduce national greenhouse gas emissions.

By addressing policy, infrastructure, and workforce gaps through targeted reforms and international collaboration, Vietnam can position itself as a leading player in the global battery industry by 2030—advancing both national development goals and international climate commitments.