POLICY BRIEF

INVESTING IN VIETNAM'S LITHIUM-ION BATTERY SUPPLY CHAIN FOR SUSTAINABLE DEVELOPMENT

HIGHLIGHTS

Vietnam is poised to become a regional hub in the lithium-ion battery (LIB) supply chain, supporting its net-zero emissions target by 2050 and addressing a projected 70% global battery undersupply by 2035. With a domestic demand forecast of 46.9 GWh by 2030, driven by electric vehicles (EVs) and battery energy storage systems (BESS), Vietnam requires $3.28–$5.39 billion in investment. This transition promises 28,750–35,000 new jobs, $2 billion in exports by 2032, and enhanced energy security. Leveraging mineral reserves, cost-competitive labor, and free trade agreements, Vietnam can capture 1.3% of the global battery market. Targeted policies and partnerships are essential to overcome supply chain, infrastructure, and workforce challenges, ensuring a sustainable and equitable energy transition.

Recommendations:

- Develop a national battery strategy with clear incentives and interministerial coordination.
- Scale localized production through gigafactories and mineral refining to reduce import dependency.
- Expand EV charging and renewable-powered industrial infrastructure.
- Build a skilled workforce through targeted training programs.
- Secure global and regional partnerships for technology and supply chain resilience.
- Promote sustainable production and recycling aligned with global standards.

INTRODUCTION

Vietnam stands at a critical juncture to strengthen its lithium-ion battery (LIB) supply chain, aligning economic growth with its commitment to net-zero emissions by 2050. This policy brief outlines a strategic framework to meet a projected domestic battery demand of 46.9 GWh by 2030, driven by 1.55 million electric two-wheelers (E-2Ws), 171,000 passenger electric vehicles (PEVs), and 10,000 MW of battery energy storage systems (BESS). This requires $3.28–$5.39 billion in investment, promising 28,750–35,000 new jobs, $2 billion in exports by 2032, and enhanced energy security.

Vietnam's competitive advantages, including 3.7 million tons of nickel reserves, low labor costs ($296.5/month), affordable electricity ($0.085/kWh), and extensive free trade agreements (FTAs), position it to capture 1.3% of the global battery market, projected to reach 3,500 GWh by 2030 (IEA,

2023). However, challenges such as import dependency, limited charging infrastructure, and workforce gaps require urgent action. Drawing on stakeholder interviews, global benchmarks (IEA, BloombergNEF), and Vietnam's policy frameworks (2021–2024), this brief proposes actionable strategies to build a sustainable battery ecosystem, leveraging the country's potential in FDI attraction and technology transfer opportunities.

CONTEXT AND STRATEGIC OPPORTUNITIES

Vietnam's battery sector aligns with a global market growing at a 21% compound annual growth rate, driven by clean energy transitions. Key strengths include:

- **Mineral Resources**: 3.6 million tons of nickel (Thanh Hoa: 3 million tons, Son La: 420,523 tons, Cao Bang: 133,677 tons), untapped graphite in Yen Bai and Tuyen Quang, and potential cobalt and rare earth elements.
- **Policy Framework**: The National Green Growth Strategy (2021), Net-Zero Transition for the Transport Sector (Decision 876), Revised Power Development Plan VIII (PDP8), Law of Geology and Mineral, and incentives like 0% import tax on EV components (Decree No. 26/2023/ND-CP).
- **Cost Competitiveness**: Labor costs 31% lower than China's ($430/month, ILO, 2025) and electricity at $0.085/kWh enable battery production costs of $73–$86/kWh.
- **Global Integration**: FTAs (EVFTA, CPTPP, RCEP) at the national level and private partnerships with firms like Gotion High-Tech, ProLogium, and CATL enhance market access and technology transfer.

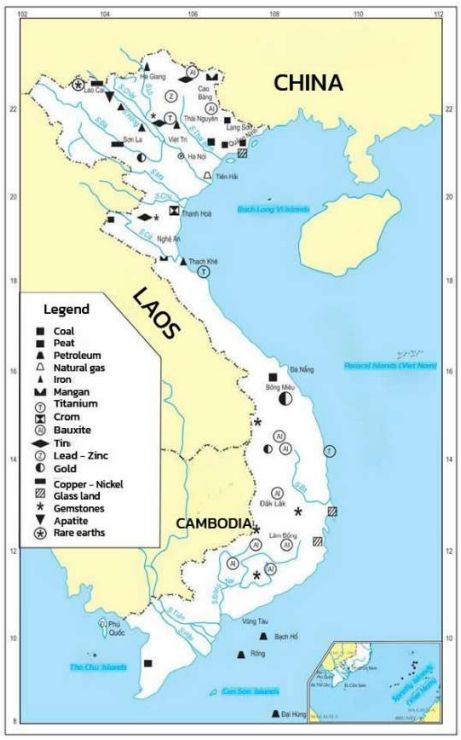


Figure 1. Map of key mineral resources of Vietnam

Domestic demand drivers include:

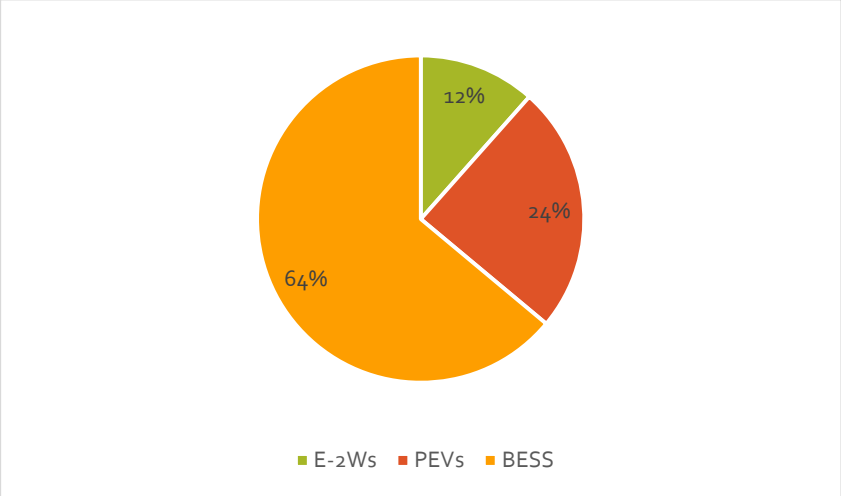
- **BESS**: 30,000 MWh (64% of demand), supporting renewable energy integration.
- **PEVs**: 11,486 MWh, targeting 30% electric car adoption by 2030.
- **E-2Ws**: 5,425 MWh, targeting 22% electric motorbike adoption.

Table 1. Summary of battery demand assumptions by segment

Segment	Unit Count / Capacity (by 2030)	Avg. Battery Size	Estimated Demand (MWh)

E-2Ws	1.55 million units	3.5 kWh	5,425 MWh
PEVs	171,000 units	67.15 kWh	11,486 MWh
BESS	10,000 MW × 3 hours (storage duration)	—	30,000 MWh
Total	—	—	**46,911 MWh**

Figure 2. Projected battery demand share by segment based on assumptions (2030)



These align with global policies, such as the U.S. Inflation Reduction Act ($35/kWh tax credits) and the EU Green Deal's carbon footprint regulations, positioning Vietnam as a competitive player in ASEAN, Europe, and U.S. markets. The domestic battery market is projected to grow from $653.6 million in 2023 to $3,479.2 million by 2030, with a 27% CAGR.

ECONOMIC AND SOCIAL IMPACTS

Investment in the battery supply chain will yield significant macroeconomic benefits:

- **Job Creation**: Scaling to 46.9 GWh could generate 28,750–35,000 jobs, with 25% high-skilled, based on benchmarks like the VinES plant (1,000 jobs for 5 GWh). The EV and battery sector could create 6.5 million jobs by 2050, including indirect jobs in logistics, technical services, and SMEs.
- **Value Addition and Economic Diversification:** Transitioning from labor-intensive, assembly-based industries towards high-value-added sectors such as graphite/nickel, lithium processing and battery cell/module assembly enables Vietnam to better leverage its export capacity. This shift enhances greater value addition, supports economic upgrading, and reduces reliance on traditional manufacturing sectors.
- **Electric Vehicle and High-Tech Industry Development:** A localized battery supply chain underpins the government's targets for electrification—30% of cars and 22% of motorbikes by 2030. Domestic production helps reduce import costs, enhances R&D in advanced

technologies such as solid-state batteries, and positions Vietnam as a rising high-tech manufacturing hub in Southeast Asia.

- **Energy Security and Sustainability:** The integration of BESS into Vietnam's power grid reduces reliance on fossil fuels, which currently make up 45% of the power mix (EVN, 2023). According to Power Development Plan VIII, BESS adoption could lower CO_2 emissions by 204–254 million tons by 2030. Battery recycling, with material recovery rates of 60–80% (IEA, 2024), further supports a circular economy, helping to manage the projected 10,000 tons of battery waste by 2030.
- **Foreign Direct Investment and Industrial Competitiveness:** Vietnam's competitive labor costs ($2.5/hour vs. $5/hour in China, ILO 2023) and targeted tax incentives (e.g., Decree 31/2021/ND-CP) enhance its attractiveness to investors. This development will also stimulate supporting industries such as electronics, logistics, and advanced manufacturing, strengthening Vietnam's position in global supply chains. Currently, FDI in battery-related industries reached $2 billion in 2023, with $500 million in nickel mining projects (2020–2023).
- **Trade and Export Potential:** With growing international demand for clean technologies, Vietnam's battery and EV exports to markets such as the EU and US are expected to reach $2 billion by 2032 (Expert Market Research, 2024). This expansion could help narrow the country's $3.5 billion trade deficit (GSO, 2023), particularly when leveraged through agreements like the EVFTA and in response to upcoming carbon border adjustment mechanisms.

CHALLENGES

Despite these opportunities, several structural and operational challenges must be addressed:

- **Policy Environment:** Vietnam's policy landscape supports upstream development through the newly enacted Law on Geology and Minerals (Law No. 54/2024/QH15), effective July 2025, which strengthens resource sovereignty for minerals like nickel and graphite. Midstream challenges, such as limited refining and cell-to-pack capabilities. are being addressed through industrial park incentives and agreements like EVFTA. However, the overall investment ecosystem remains underdeveloped and requires targeted reforms. Downstream demand from EVs and BESS places additional pressure on cost efficiency, quality, and supply chain resilience. Incentive structures under Decree 182/2024/ND-CP and the 2020 Investment Law offer a supportive base but must be accompanied by cohesive implementation strategies.
- **Cost and Affordability:** The high upfront cost of EVs, compared to internal combustion engine vehicles, is a barrier given Vietnam's GDP per capita of $4,000. While subsidies and financing schemes offer some relief, broader adoption depends on further cost declines—particularly in raw materials and cell production.
- **Charging Infrastructure Gaps:** Rural and remote areas face a lack of charging stations, impeding EV uptake. Although models such as VinFast offer 300 km range and 30–60 minute fast charging, these require significant infrastructure investment and consumer education to become viable at scale.
- **Raw Material Constraints:** Vietnam imported $747 million in ores in May 2025, reflecting dependence on international sources for lithium and other battery minerals. While

domestic reserves of nickel and graphite exist, refining and processing capacity remains underdeveloped. Ongoing exploration must be followed by accelerated investment in refining capabilities.

- **Technological Maturity:** While Vietnam has made progress in battery assembly and integration, core manufacturing technology remains nascent. Firms like VinFast and Vingroup are advancing toward self-sufficiency, but more time and capital are needed. International R&D collaborations are essential to improving energy density and reducing costs.
- **Workforce Skills:** Battery production demands a highly skilled workforce. While Vietnam's labor pool is growing in sophistication, there is a shortage of domain-specific expertise in battery chemistry, system integration, and advanced manufacturing. Investment in specialized training programs and partnerships with institutions in countries with mature battery sectors is vital.

POLICY RECOMMENDATIONS

To harness its battery sector potential, Vietnam must implement a comprehensive and equitable strategy by 2030, balancing economic competitiveness, energy security, and social equity. The following recommendations address structural gaps, align with national priorities, and promote global integration:

1. **Develop a national battery strategy with Interministerial Coordination**
   Vietnam should formulate a comprehensive battery strategy covering upstream (raw materials), midstream (processing), and downstream (manufacturing) segments, aligned with the National Green Growth Strategy and PDP8. This strategy must clearly outline policy priorities, timelines, and implementation responsibilities. An Interministerial Battery Task Force should be established, modeled on Colombia's Intersectoral Commission on Climate Change, to coordinate action across finance, industry, and energy ministries. The government should introduce targeted fiscal incentives, including a $10/kWh production subsidy, similar to the U.S. Inflation Reduction Act, to catalyze $1.5 billion in private sector investment by 2028. The roadmap should also include safeguards to support a just transition for workers in fossil fuel-dependent industries.
2. **Scale Localized Production to Reduce Import Dependency**
   Vietnam should establish 10–15 GWh lithium iron phosphate (LFP) gigafactories, taking advantage of Decree 182/2024/ND-CP, which offers tax and land incentives for high-tech investment. The government must accelerate domestic nickel sulfate and graphite refining in key areas such as Ban Phuc and Dak Nong to process at least 80% of local mineral inputs, reducing reliance on imported materials from 85% to 20%. Public-private partnerships, such as VinFast's collaboration with Gotion High-Tech, should be supported to localize cathode and anode production, lowering production costs by up to 15% and increasing global competitiveness.
3. **Strengthen Infrastructure for Electric Vehicles and Battery Production**
   To support widespread EV adoption, the government should expand the national charging network, with a minimum of 60% located in rural and peri-urban areas. At the same time, Vietnam should develop renewable-powered battery industrial zones, drawing inspiration from Indonesia's Sulawesi Industrial Park, to ensure that at least 50% of energy used in battery

manufacturing is renewable. A dedicated public investment should be allocated for grid upgrades to reduce curtailment risks and facilitate the integration of 10,000–16,300 MW of battery energy storage systems.

4. **Build a Skilled Workforce through Targeted Training and Research Investment**
   Vietnam must address its technical skills shortage by establishing five specialized training centers by 2028 in collaboration with international firms such as CATL and top domestic universities. These centers should train at least 10,000 engineers in battery chemistry, recycling, digital manufacturing systems, and related fields. All training programs should incorporate gender equity goals, ensuring at least 30% female participation. Concurrently, national R&D spending should be increased to 1% of GDP by 2030, following South Korea's model for innovation-driven industrial growth.
5. **Promote Strategic Global and Regional Partnerships to Enhance Resilience**
   The government should pursue joint ventures with global technology leaders—including CATL, LG Chem, and Tesla—to facilitate the transfer of advanced battery manufacturing and recycling technologies. It should also initiate the formation of an ASEAN Battery Alliance to coordinate regional supply chains, facilitate knowledge exchange, and enhance geopolitical resilience. Bilateral agreements should be negotiated to secure 50,000 tons of nickel per year from Indonesia, while existing FTAs (EVFTA, CPTPP) should be fully leveraged to expand battery exports to key markets in Europe and North America.
6. **Promote Sustainable and Equitable Battery Production and Recycling**
   To meet international environmental standards, Vietnam should mandate that at least 50% of energy used in battery production comes from renewable sources by 2030. The government must implement a national battery passport system to track lifecycle emissions, aligned with EU and global requirements. An initial investment should be made in hydro-metallurgical recycling facilities, with the goal of achieving 70% lithium recovery by 2035. Social equity must be embedded across the supply chain through retraining programs for fossil fuel workers and inclusive employment policies targeting marginalized communities.

CONCLUSION

Vietnam's development of a robust LIB supply chain offers a transformative opportunity to achieve energy independence, drive economic growth, and contribute to global climate goals. With $3.28–$5.39 billion in investment, Vietnam can meet its 46.9 GWh domestic demand, create 28,750–35,000 jobs, and establish itself as a regional battery hub by 2030. By addressing supply chain, infrastructure, and workforce challenges through coordinated policies and international partnerships, Vietnam can secure a competitive edge in the global clean energy transition, fostering sustainable and inclusive development.

Note: This brief draws on primary stakeholder interviews, focus groups, global benchmarks (IEA, BloombergNEF), and Vietnam's national policy frameworks (2021–2024).