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# CATL Investment case in ASEAN countries: Indonesia, Thailand, Vietnam

## Introduction

In the rapidly evolving landscape of sustainable energy solutions, lithium-ion batteries have emerged as the cornerstone of the electric vehicle revolution and energy storage systems. As the world accelerates towards a low-carbon future, Contemporary Amperex Technology Co. Limited (CATL), a global leader in lithium-ion battery technology, seeks to capitalise on investment opportunities within the Association of Southeast Asian Nations (ASEAN) region. This investment case study delves into CATL's strategic pursuit of investments across the entire lithium-ion battery supply chain in three ASEAN countries—Indonesia, Thailand, and Vietnam.

The central figure in this case study is CATL's seasoned investment manager, Mr. John Chen, whose expertise and experience in the energy storage industry will be instrumental in navigating the intricate landscape of ASEAN's markets. Chen's primary objective is to explore investment prospects at various stages of the lithium-ion battery supply chain, starting with raw material mining, progressing through material production, cell manufacturing, and battery pack assembly, and concluding with cell and pack recycling.

In assessing the investment viability, Mr. Chen will meticulously evaluate multiple market factors, including political dynamics, regulatory environments, market-specific needs, and existing infrastructure within each ASEAN country. Understanding the

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interplay of these factors will enable him to make informed decisions on the potential for successful investments that align with CATL's long-term growth strategy.

To guide you through your investment decision, keep the following key questions in mind:

1. At which stage of the value chain should Mr John Chen invest in Indonesia to maintain its competitive advantage, considering the country's policies, and commitment to becoming a top battery & component manufacturing hub, with a competitive landscape?
2. Considering the potential of the Thai EV Market and the existing presence of CATL in neighbouring Indonesia, is it better for CATL to invest and establish independently within Thailand or partner up with local players instead to leverage existing branding, relationships, and government incentives?
3. Considering the competitors present in Vietnam for the battery pack and cell manufacturing, what would be the strategic action plan from CATL for investing \$241 million by addressing the gap in the supply chain considering the EV projections in Vietnam?

## Overview of CATL, its investment approach

Contemporary Ampere Technology Co. Limited (CATL) is a global leader in the production and development of lithium-ion batteries. Founded in 2011 by entrepreneur Robin Zeng, CATL quickly rose to prominence, playing a crucial role in the electric vehicle revolution and energy storage sector. With a strong commitment to innovation and sustainability, CATL has consistently pushed the boundaries of battery technology, solidifying its position as a frontrunner in the industry.

## Milestones and Achievements

- As of 2022, CATL's annual revenue exceeded \$45 billion [1], demonstrating robust financial performance and steady growth over the years.
- In the same year, CATL was ranked as the world's largest electric vehicle battery manufacturer by market share, surpassing other industry giants like LG Chem and Panasonic.
- CATL has an extensive global reach, with manufacturing facilities and subsidiaries across China, Germany, Japan, and the United States, enabling them to serve multiple markets efficiently.
- CATL has rapidly expanded its production capacity to meet the growing demand for electric vehicles and energy storage solutions. As of 2022, its annual lithium-ion battery production capacity surpassed 390GWh [1], making it one of the largest battery manufacturers in the world.

## Business Strategy & Outlook

As per Frost & Sullivan's analysis, CATL secures the top position in the global electric vehicle (EV) battery market, commanding an impressive 33% market share based on installed capacity in 2021. Moreover, within China, CATL dominates with an even more substantial 52% market share. This leading position is further strengthened by CATL's collaboration with major automakers, including Tesla, Nio, Xpeng, Geely, SAIC and Volkswagen as its key customers.

Anticipated growth in battery demand is primarily driven by the surge in New Energy Vehicles (NEVs) in China, stimulated by regulatory initiatives and improving charging infrastructure. Remarkably, China witnessed a remarkable year-over-year growth of 1.7 times, selling 3.3 million passenger NEVs in 2021 compared to just 6.5% growth in the overall passenger car market. The strong NEV adoption trend is expected to accelerate, with passenger NEVs projected to account for over 30% of total passenger car sales by 2025.

In line with the global energy transition and carbon-neutral objectives, the worldwide EV battery installed capacity is projected to experience substantial growth, achieving a remarkable Compound Annual Growth Rate (CAGR) of 34% from 2022 to 2026. Frost & Sullivan forecasts the total installed capacity to reach an impressive 1,387 gigawatt-hours by 2026, with China accounting for more than 50% of the global demand.

As an essential player in China's NEV value chain, CATL has seen remarkable market share expansion, growing from 15% in 2015 to nearly half of the EV battery market in recent years. To capitalise on the significant growth potential, CATL is planning to expand its battery capacity to a substantial 670 GWh by 2025, with a focus on establishing around 100 GWh capacity in Europe. To ensure a reliable and integrated upstream supply, the company has been actively investing in cathode and related materials, such as lithium, nickel, and cobalt resources.

Recognizing the importance of innovation, CATL dedicates substantial resources to research and development to maintain its position at the forefront of battery technology. The company's strategic focus includes the commercialisation of third-generation cell-to-pack (CTP 3.0) battery technology in 2023, which promises enhanced energy density and an extended driving range. Moreover, CATL is targeting the launch of cell-to-chassis highly integrated battery technology by 2025. Additionally, the company has been vigorously pursuing advancements in high-nickel battery development to bolster safety standards and aims to introduce solid-state batteries in 2025, with significantly higher energy density compared to current lithium-ion batteries.

## ASEAN's Market Potential and Unique Challenges

The ASEAN region represents a dynamic landscape for lithium-ion battery investments. Indonesia, Thailand, and Vietnam in particular, have been fervently

embracing electric mobility and sustainable energy initiatives, fuelled by robust government support, incentives, and ambitious targets for electric vehicle adoption and renewable energy integration. These factors present a favourable environment for CATL to establish a strategic presence in the region.

However, with unique market conditions, each country also poses its distinct set of challenges. Political stability, local regulations, raw material availability, supply chain integration, and the existing industrial ecosystem will shape the investment landscape in each ASEAN nation. Mr. Chen must carefully navigate these intricacies to determine the feasibility and potential impact of CATL's investments in the lithium-ion battery supply chain vertical.

Through an in-depth analysis of the opportunities and challenges in Indonesia, Thailand, and Vietnam [2][3][4][5], this investment case study will provide a comprehensive assessment of CATL's investment strategy. By adopting a holistic view of the region's market conditions, Mr. Chen will be empowered to make strategic investment decisions that align with CATL's commitment to sustainability, technological advancement, and market leadership in the rapidly evolving lithium-ion battery industry.

## **Introducing the Investment Manager: Mr. John Chen**

Mr. John Chen is a seasoned investment professional with a deep understanding of the energy storage industry. Having played a pivotal role in CATL's international expansion, he possesses extensive knowledge of the evolving dynamics in lithium-ion battery technology and the EV market. As the lead investment manager at CATL, Mr. Chen is responsible for spearheading strategic investments, forging key partnerships, and identifying growth opportunities in emerging markets. With a sharp acumen for assessing market trends and a passion for sustainable energy solutions, Mr. Chen is well-equipped to navigate the complexities of ASEAN's diverse economies.

## **I. Indonesia Market Overview & Proposed Company for Investment**

Indonesia, the world's largest archipelago with over 270 million people, is ASEAN's largest economy with a GDP of approximately US\$1.3 trillion [6] in 2022. With its strategic geographical advantage and abundant natural resources, the country has set its ambition to become the leading lithium-ion battery and component manufacturing hub in the region. With national sustainable development targets and growing global demand for sustainable electrification solutions, Indonesia is poised to be a pivotal player in the international battery industry and value chain.

### **Battery Value Chain**

The country's vision encompasses the entire battery value chain - from mining and refining battery metals to manufacturing precursor cathode active materials, battery cells, battery packs, EVs, and implementing battery recycling. In the past three years, Indonesia has attracted over a dozen deals amounting to more than \$15 billion [7] for the production of battery materials and EVs.

Starting from the upstream supply chain, Indonesia is the largest nickel producer globally, contributing over 1 million metric tons [8] annually and to 37% of total global nickel production in 2021. Possessing 25% of the world's known nickel resources, its ban on nickel ore exports since 2020 has garnered foreign investments and added value in the nickel refining process. Additionally, nickel and cobalt, by-products of nickel processing for batteries in Indonesia, are essential components of the majority of EV batteries globally. Shifting from raw materials production, Indonesia's development of nickel-based products has amassed \$20.9 billion in revenues in 2022. Its government has highlighted that the continuation of its nickel policies could further spur Indonesia's GDP to \$3 trillion by 2030.

Beyond its strengths in mining, Indonesia aims to expand its refining capacity for battery-grade chemicals. While the country currently has a manganese sulfate capacity of around 800 tons, several key projects are expected to significantly accelerate Indonesia's refining capabilities and are expected to be operational within the next five years. The government is also targeting to reach 140GWh in cell manufacturing capacity by 2030.

Moving to the downstream supply chain, the Indonesia Battery Corporation (IBC) was established in 2021 to accelerate industry developments domestically. The IBC involves four state-owned companies, nickel miner Anelka Tambang (Antam), mining holding company MIND ID, oil & gas enterprise Pertamina, and electric utility company PLN. As part of this, the government has mandated overseas EV battery companies to partner with IBC in EV battery manufacturing.

Indonesia is ASEAN's largest vehicle market and has one of the world's largest vehicle fleets. In 2022, there were 125 million [9] motorcycles and 16.4 million [10] cars in circulation. It is also looking to create a domestic market for EVs as part of the national targets to reduce greenhouse gas emissions by 2030. With this, Indonesia has set the domestic EV industry development as a national priority and the goal of 2+ million EV 2-wheelers and 2.5 million total EVs by 2025. Sell 2+ million EV 2-wheelers and 2.5 million total EVs by 2025. Produce 7.7+ million EV 2-wheelers by 2025. Make 20% of annual vehicle production by 2025 and 30% by 2035 Low Carbon Emission Vehicles (LCEV), including hybrid vehicles, PHEV, BEV, and FCEV [11].

Indonesia's EV ecosystem is projected to have a Total Addressable Market (TAM) of \$20 billion [12] by 2023, with R&D and manufacturing garnering the largest opportunity of up to \$15 billion. Within this, the country's battery management system and cell manufacturing are expected to reach \$3 to \$4.5 billion, and the charging infrastructure to be worth from \$2 to \$3 billion. The after-sales of service, maintenance, and battery

recycling market could reach between \$500 million to \$1.5 billion by the end of the decade.

However, the country's current EV adoption is still a significant distance from its aspirations - with 7,600 electric four-wheelers and 26,000 electric motorbikes utilised in 2022. At the same time, EV adoption trends in the Asia Pacific could indicate an accelerated penetration level in Indonesia in the future. In the region, Vietnam's EV two-wheeler use increased from 1.2% to 9.7% and China experienced its EV two-wheeler adoption rates increasing from 0.5% in 2015 to 19.7% in 2021.

While EV adoption in Indonesia is still nascent, the battery recycling sector is expected to exponentially grow in the coming years, particularly for EV batteries. Additionally, the government has required end-of-life batteries to be recycled. Developments in this sector have been gradual, with the reuse or recycling of battery cell waste yet to be fully developed domestically. The plan for the first battery recycling plant in Indonesia is expected to commence operations in 2024.

## Government Policies and Incentives

In addition to mining policies and the nickel ore export ban, most of the government policies have been driven by accelerating the growth of the domestic EV industry.

The umbrella guidance for this has been Presidential Regulation No. 55/2019, which involves technical specifications for EVs, local content requirements, limiting the use of internal combustion engine four-wheelers in the future, and comprehensive incentives for battery industry developments, as well as battery recycling requirements. Additionally, there have been ongoing plans to implement significant subsidies for the sale of EVs.

Of note, the Indonesian local content requirements would require EV manufacturers to utilise locally manufactured goods, with plans to increase this to 80% by 2030. Currently, the import of certain components, such as battery cells, is still allowed for a certain period. Additionally, the national standardisation of EV batteries is expected to be established by this year, which will enable the distribution of batteries to all EV ecosystem stakeholders and further advance the growth of the domestic EV industry.

## Competitive Landscape

With over a dozen deals from foreign investors in Indonesia's battery industry over the past three years, most investments have focused on the domestic production of EVs and EV battery cells.

Referring to Exhibit 1, noteworthy investments include the LG Energy Solution (LGES) \$9.8 billion EV battery deal. As part of this deal, LGES and Hyundai Motor Group will build the country's first EV battery cell plant with an expected production capacity of 10 GWh annually starting in 2024. Also, as part of this investment deal, LGES has started the construction of a \$3.5 billion smelter to generate 150,000 tons of nickel sulfate annually and a \$2.4 billion factory to create 220,000 tons of precursor and

42,000 tons of cathode annually. Additionally, Hyundai launched a battery-powered EV plant facility in 2022, its first in ASEAN.

### **CATL's presence and current investments**

CATL has been one of the main foreign investors in Indonesia's electric vehicle hub aspirations. In 2022, CATL signed a tri-party framework agreement with Antam and IBC for the Indonesia EV Battery Integration Project, which involves nickel mining and refining, EV battery materials and manufacturing, as well as battery recycling. The nearly \$6 billion [12] investment will focus on the project located in FHT Industrial Park in Indonesia's North Maluku province, as well as other locations across the country. This investment is expected to build a comprehensive industrial base for batteries in Indonesia.

In 2022, the company has also partnered with Indonesia's sovereign wealth fund, the Indonesia Investment Authority, to launch a green EV fund of at least \$2 billion [14]. The fund will focus on the EV value chain and seize these opportunities primarily in Indonesia. Partnering with CMB International, the fund has been looking for additional limited partners to invest in this green EV fund.

Additionally, CATL supplier Lopal also has plans to construct a \$290 million [15] battery material plant in the country. Its use of proceeds will go towards building a 120,000-ton lithium iron phosphate plant in the Central Java province.

### **Challenges**

Despite the expected reduction of emissions from sustainable electrification and mobility, Indonesia's battery value chain has faced Environmental, Social, and Governance (ESG) concerns in recent years. Primarily, the issues have centred on the sustainability of the mining and extraction process of raw materials, which has caused significant environmental and social impacts across various sites in the country.

While the growth potential for Indonesia's battery industry is highly attractive, the initial capital costs to establish a battery manufacturing plant are still significantly sizable. Referring to Exhibit 2, the decentralised nature of Indonesia's archipelago and battery component sources in diverse locations can also add to additional logistics and infrastructure costs for battery products. While EVs are deemed to be the primary driver for battery investments and developments in Indonesia, EV adoption in the country is lagging behind the world's top EV markets.

### **Opportunities**

The market study on Indonesia presents CATL with promising opportunities to capitalise on the nation's ambition of becoming an ASEAN lithium-ion battery hub. With a comprehensive battery value chain, abundant nickel resources, and a growing EV market, CATL can strategically invest in refining capacity, EV manufacturing, and battery recycling. Collaborations with state-owned companies and a green EV fund

partnership further solidify CATL's position in Indonesia's battery industry. Despite challenges like ESG concerns and capital costs, CATL's technological prowess and forward-thinking approach position the company to play a pivotal role in Indonesia's sustainable energy journey toward a greener future.

## II. Thailand Market Overview & Proposed Company for Investment [16]

Thailand, also known as “The Detroit of Asia” with a population of over 70 million people and a GDP of US\$536 billion in 2022, is an emerging hub for EV Battery manufacturers in the ASEAN region. With its strategic location and access to abundant resources of lithium and cobalt, Thailand is positioning itself to play a leading role in the lithium-ion battery and component manufacturing industry within the ASEAN region. Thailand, with its rapidly growing economy, is aiming to capitalise on the rising global demand for sustainable electrification solutions, thereby becoming a pivotal player in the international battery value chain.

### Market Opportunity [17]

Thailand's current EV market accounts for US\$ 1,052 million in 2023, with a projected annual growth of (CAGR 2023-2028) of 5.02%, resulting in a projected market volume of US\$1,344 million by 2028. According to Forest & Sullivan, Thailand's EV market will reach 1.2 million units by 2030, accounting for 30% of the total vehicle sales (dubbed at 30@30), which will require an annual domestic production of 40 Giga Watt hours (GWh) worth of batteries.

### Battery Value Chain [18]

Similar to the rise of other key Asian players like Vietnam, Indonesia, and Singapore, Thailand is also actively building a strong supply chain by leveraging relationships with global EV and battery manufacturers. Thailand's vision encompasses the entire battery value chain, ranging from the mining and refining of battery metals to cathode active materials, battery cells, packs, and Electric Vehicles (EVs), along with implementing battery recycling initiatives. In recent years, the nation has managed to attract substantial investments, exceeding \$10 billion, from various deals pertaining to battery materials and EV production. With a growing number of deals and investments, the country is establishing itself as a formidable player in the battery industry. The Thai government has been actively encouraging and supporting these initiatives to drive economic growth and sustainability.

### Lithium, Nickel, and Cobalt

In reference to the upstream supply chain, Thailand boasts considerable reserves of key battery metals, including lithium, nickel, and cobalt. The country's commitment to sustainable practices and resource management has garnered foreign investments in



refining and value-added processing for these battery metals. As the demand for EVs and battery-powered technologies grows, the importance of these resources will likely play a significant role in shaping Thailand's economy and global influence.

### **Refining Capacity and Manufacturing**

Thailand aims to expand its refining capacity for battery-grade chemicals to meet the increasing demands. With the implementation of several key projects over the next few years, the country aims to significantly boost its refining capabilities. Additionally, the government is actively encouraging the establishment of advanced battery cell manufacturing facilities, with a goal of achieving a manufacturing capacity of 100 GWh or more by 2030.

### **Battery Recycling**

Thailand acknowledges the importance of battery recycling to ensure sustainable practices in the EV industry. The government has begun structuring policies and regulations in place to encourage and mandate battery recycling initiatives. Although the battery recycling industry may still be in its nascent stages, Thailand recognizes its potential and aims to develop this sector further.

### **Government Policy and Incentives [19]**

Thailand's government is actively encouraging and supporting investments to accomplish these goals by offering incentives such as subsidies in the shape of US\$714 million and a reduction in taxes for battery manufacturers from 8% to 1%. These recent initiatives along with the hosting of the first ASEAN Battery and Electric Vehicle Technology Conference in Bali, show strong intent and commitment towards the future growth and development of Thailand's EV economy. Thailand, like its other ASEAN neighbours, will attract many investments from foreign EV and Battery makers.

### **CATL presence and current investments [20]**

Due to substantial growth potential in the ASEAN EV market, many top global battery players such as CATL are already forming local partnerships to establish a stronghold in the Thai market. Their recent partnership with Arun Plus, a leading energy conglomerate is a key stepping stone for future collaboration and investments from Chinese manufacturers into the ASEAN region. CATL announced to investment of up to \$6 billion to build a factory with a local company. It aims to complete the project by 2026 and establish vertically integrated production that includes upstream processes such as mining nickel, a vital raw material.

Recently automotive OEMs such as Great Wall Motor, BYD, and MG, along with Energy players Gotion and Energy Absolute have announced their intent to establish Energy storage and EV manufacturing facilities in Thailand [21, 22].

## CATL future investment opportunities

In a growing global market, there are many key stages of the supply chain that need to be established and secured to ensure smooth production and delivery of batteries. Although CATL has partnered with local energy players to establish facilities that manufacture battery packs for EV manufacturers, CATL must focus on attaining two partnerships. One is to partner with OEMs currently present in Thailand or those who plan to establish a manufacturing facility soon. This will ensure local pack manufacturing by CATL for OEMs that are already building vehicles locally therefore reducing costs for both stakeholders. The second important part of the value chain that CATL should attain is securing raw materials locally. Since Thailand has a reserve of lithium, nickel, and cobalt, acquiring access to these critical materials by partnering with local mining facilities will not only secure supply but will also drastically cut costs, improving profitability margins.

### III. Vietnam Market Overview & Proposed Company for Investment

The extent of investment potential in Vietnam's lithium-ion battery industry is examined in this section. The investigation's guiding concepts include an analysis of the current battery market, the presence of Electric Vehicle (EV) firms in Vietnam, the existence of Vietnamese battery manufacturers with a focus on EV applications, and the use of batteries for energy storage. To support better logistics and have a faster turnaround time (TAT), this report also takes into account the scope of extracting the raw materials needed for battery manufacture and the probable places where the battery manufacturing plant can be located. The range of investment opportunities in potential areas, such as the current market landscape, present and future manufacturing capabilities to meet the demands in ASEAN countries, and the economy underlying the manufacturing scalability, are finally investigated to invest in the battery manufacturing industry.

#### Battery Value Chain

Vietnam is situated near Cambodia at the eastern tip of the Asian continent, while China is situated above Vietnam. In recent years, multinational mining corporations have become more interested in Vietnam's abundant, high-quality nickel assets. The emergence of electric vehicles has led to a surge in demand for raw resources like nickel, a crucial component of the lithium-ion batteries that drive electric motors. With the joint aspirations of local conglomerate Vingroup and Australian mining company Blackstone Minerals, Vietnam is now positioned to become a center for the production of lithium-ion batteries and even electric vehicles.

Lithium-ion batteries are now the preferred energy storage option for many manufacturers of anything from autos to portable electronic devices. Lithium-ion battery cells are more energy-dense and lighter than standard lead-acid or nickel-cadmium rechargeable batteries when compared to other battery technologies.

Nickel is very easy to come by in Vietnam, and the rise in battery demand has caused formerly unprofitable nickel mines to reopen. The two countries that produce the most nickel worldwide are Indonesia and the Philippines, although Vietnam is planning to increase its output in response to the entrance of the Australian business Blackstone Minerals.

The first production is scheduled to begin in 2025 at the Ta Khoa Nickel Project (TKNP), which the ASX-listed company acquired in the nation's northern Son La Province. Nickel, copper, cobalt, and platinum group elements are abundant in the mine.

The Ta Khoa refinery project (TKR) will supplement Blackstone's mining activities as part of its fully integrated Vietnam company. By the beginning of 2023, the company is anticipated to make a final investment decision about the Ta Khoa project, which calls for an estimated US\$854 million in capital expenditures.

The lithium-ion battery business needs the high-grade nickel sulfide mineralization that is present in the mines. Blackstone anticipates that the project would establish it as a major manufacturer of high-purity NCM811 nickel-based precursor materials for lithium-ion battery manufacturing on a worldwide scale. The cathodes of EV batteries are made of nickel, cobalt, and manganese in an 8:1:1 ratio, or NCM811.

The infrastructure of Northern Vietnam is well-developed and ready for investment, including power, highways, and ports. Leading EV battery producers LG Chem and Samsung SDI are already present in the area. These companies have made investments and built electronic supply chains that enable investors to access these networks. To encourage more resources to be processed domestically and to support the development of a whole EV battery supply chain, Indonesia, a major supplier of nickel, prohibited the export of nickel ore in 2020. Indonesia not only has significant nickel deposits, but it also has direct trade connections to China and Japan, two major producers and users of batteries and electric vehicles. The nation is a nickel powerhouse, but it lacks battery-grade nickel.

EVs are going to dominate Vietnam and other countries as the demand for them grows. Vietnam has acknowledged the need for EVs to displace gasoline-powered cars, as have its regional counterparts. The most recent entry into lithium battery production will assist the government in further achieving its objectives of boosting the economy and changing from a low-grade manufacturer to a high-grade one as Vietnam aims to become a hi-tech manufacturer.

Seven E2W manufacturers produce E2Ws in Vietnam, and six are Vietnamese enterprises, including VinFast, Pega, Anbico, Detech, DK Bike, and Datbike [23].

In Vietnam, the number of electric vehicles, including hybrid, plug-in hybrid, and pure electric vehicles, remained low at 140 in 2019, 900 in 2020, and a further 600 units as of the first quarter of 2021, with the majority of them remaining hybrid types [24]. In November 2021, VinFast, a division of VinGroup and the premier local EV manufacturer in Vietnam, successfully introduced two electric car models, the VF e35 and VF e36, at

the Los Angeles Auto Show (LAAS). Vingroup has also launched VinBus, which will run e-buses in Hanoi, Ho Chi Minh City, Haiphong, Da Nang, and Can Tho. VinFast plans to create 20,000 electric cars and 1,500 buses by 2022.

KIA, Mercedes-Benz, Toyota, Daimler, Tesla, Proterra, Nissan, BYD, Honda, Hyundai, VDL, ABB, and Volvo are the leading EV players in Vietnam. The majority of enterprises have released or intend to offer new items for sale in Vietnam in 2022. The KIA EV6 was unveiled to the Vietnamese market in mid-2021 and will go on sale in 2022.

With a population of almost 100 million people, motorbikes are owned by more than 60% of Vietnam's population. Vietnam's automobile ownership rate of 5.7% in 2020 is still significantly lower than in other Asian economies. This rate is predicted to rise to 9% by 2025 and 30% by 2030, making Vietnam one of the countries with the fastest-growing passenger car demand, at 10.5%.

Vietnam has a young population and a growing middle class, both of which are interested in cutting-edge technology, fuel efficiency, and environmental consciousness. There is potential for the electric vehicle market to grow by double digits in the next few years.

The rising demand for passenger automobiles, the popularity of ride-sharing fleets, and the prevalence of gas-powered motorbikes have all contributed to high levels of air pollution and traffic congestion in major cities such as Hanoi and Ho Chi Minh City. To tackle pollution, the government has proposed legislation that will progressively prohibit motorbikes on city streets in key cities such as Hanoi, Hai Phong, Danang, Ho Chi Minh City, and Can Tho by 2030, paving the door for EV adoption in the country.

## **Policies and Incentives [24]**

There are no defined governmental frameworks or incentives for the electric car sector in Vietnam. Several measures have been implemented by the government to encourage EVs through its sustainable development strategy, which focuses on four key areas: sustainable development, green growth, climate change, and environmental protection legislation. The policy framework for EV and charging infrastructure development is still in its early stages, and it includes:

- Resolution 55/NQ/TW, released on February 11, 2020, giving Guidelines for the National Energy Development Strategy through 2030 with a Vision to 2045, is the first official national policy requiring the development of e-mobility and energy storage in accordance with worldwide trends.
- Decision 1095/Q-BGTVT dated June 17, 2021, on developing a National Transportation Vehicle Development Strategy with the goal of developing environmentally friendly automobiles, which will be executed by the Transport Development and Strategy Institute between 2022 and 2023.
- In July 2020, the United States approved the Paris Agreement, with a pledge in its revised Nationally Determined Contribution (NDC) to reduce GHG emissions by 9% by 2030. EV adoption has the potential to significantly cut GHG emissions in the transportation sector. As part of the NDC plan, Ho Chi Minh City was

chosen as the first area to conduct research on the e-transportation development plan, incorporating e-vehicles in the southern hub, in January 2022.

- In 2012, the National Green Growth Strategy (NGGS) was established by Decision No. 1393/Q-TTg. The Ministry of Planning and Investment is developing a new NGGS for the period 2021-2030 that includes vehicle electrification. Furthermore, several provincial Green Growth Action Plans contain transportation and electrification objectives.
- The Hanoi Green Growth Strategy calls for e-motorbikes to account for 5% of total motorcycles in Hanoi by 2030.
- The Nha Trang Green Growth Strategy intends to have 200 e-buses in service by 2025.
- Vietnam Automobile Manufacturers Association (VAMA) suggested the National Automobile Development Strategy (2021-2050) to promote manufacture and expand the volume usage of e-vehicles. Electric car manufacturing capacity will expand dramatically between 2030 and 2040, reaching 3.5 million vehicles by 2040.

The Vietnamese government has made new decisions to boost the growth of the EV industry, including

- Decree 10/2022, beginning March 1, 2022, exempts battery electric vehicles from registration fees for the first three years and reduces fees by half for the next two years.
- Law no. 03/2022/QH15, effective March 1, 2022, reducing the excise tax rate for battery electric vehicles to 1-3% for a five-year period beginning March 1, 2022.

## CATL's presence and current investments

In Vietnam, Vinfast cars are in high demand as compared to buses and other electric vehicles. This implies that most of the cells produced by CATL will be catered to electric cars. Considering the CATL portfolio of cells, LFP and NMC are widely used in electric cars. However, the chemistry might differ slightly depending on the electric car's targeted performance and the application demanded by the user. The chemistry-specific requirements are applicable to electric buses proposed in Vietnam. However, the battery capacity demanded by electric cars is approximately equivalent to one-third of an electric bus application. Thus, the number of cells to be produced by CATL shall consider the futuristic demands in Vietnam. The popular models of electric cars and buses deployed in Vietnam are listed in [Table 1].

## Competitive Landscape

Today, there are three companies where the investment for cell manufacturing had Kickstarter from Gotion. One of the major conglomerates is the VIN group. Gotion also supports VIN Fast through strategic collaborations in cell manufacturing. Pham Naut is

the richest person in Vietnam who invested in electric vehicle research and enhancing the battery value chain.

- VIN Group [25]:

Vingroup Joint Stock Company (Vingroup JSC), formerly known as Technocom, was founded in Ukraine in 1993 by an ambitious group of Vietnamese youths. Technocom began with food production and quickly found great success with the Mivina brand. During the early years of the 21st century, Technocom was ranked among Ukraine's Top 100 largest and most influential companies. In 2000, Technocom-Vingroup returned to Vietnam with the ambition to contribute to the country's development.

- VIN Fast [25]:

VinFast LLC is a Vietnamese-founded, Singaporean-based private automotive company. Established in 2017 in Hải Phòng, it is a member of the conglomerate organization Vingroup, one of the largest private conglomerates in Vietnam that was founded by Phạm Nhật Vượng. It is the first Vietnamese car brand to expand into global markets as well as the first to expand into producing electric vehicles (EV) such as electric cars and electric scooters

- Pham Naut [26]:

Pham Nhat Vuong studied in Russia and started a popular instant noodle business in the Ukraine in the 1990s before moving back. Today, Pham chairs Vingroup, one of Vietnam's largest conglomerates with interests in real estate, retail and healthcare among others. He turned some investments into non-profit ventures, including some in healthcare, education and sports. He also built a centre of contemporary art. The group's main units include automaker Vinfast, property developer Vinhomes and Vinsmart, which makes smartphones and other devices. In 2021, he launched the first electric vehicles in the US market. Vinfast plans to invest \$4 billion in an EV factory in North Carolina to make electric SUVs.

## Challenges

The cost of battery pack manufacturing is relatively high when compared to the cells that are manufactured locally in Vietnam. Gotion collaborated with Vin Fast and invested in Vietnam for localised cell manufacturing. Hence, the investment proposed by CATL should consider the challenges, especially in the amount invested, cells in demand as well as the cost involved in materials, labour, maintenance, land and building, energy, overheads and scrap. Referring to exhibit 3, considering the fact that \$174 million from VIN group, \$275 million collectively from VIN Fast and Gotion, and \$2.5 billion from Pham Naut, the total investment in battery pack manufacturing sums up to be \$2.94 billion. Referring to the projected demands for EVs from Vietnam, there is a huge scope of investment from CATL seems to be optimistic provided the construction facility, labour and logistics are controlled. The overall cost of battery pack manufacturing is 137\$/kWh from the projections considered on the Gotion and VIN Fast group.

In predicting the number of cells required to meet the demand in Vietnam, the CATL cells from LFP and NMC chemistry are considered. The cells considered in this analysis are depicted in Tables 2 and 3. The infographics on the number of cells required when cells A, B, C and D from LFP and NMC chemistries are depicted in exhibits 4 and 5. The costs incurred in cell manufacturing when compared with other countries like China, Germany, USA etc. are depicted in exhibits 6 and 7.

## Opportunities

Considering the shortage of cells in demand and excluding the targets kept by Gotion, the number of cells required for LFP and NMC chemistry is depicted in the appendix section. At first glance, it sounds optimistic for CATL to invest in Vietnam for cell manufacturing. However, the capital cost of manufacturing and the overhead costs need to be addressed by the CATL team considering the minimum time required to obtain the Return on Investment (RoI). The costs involved in battery manufacturing while considering the land and building cost, material cost, labour cost, maintenance and overheads are projected. Here, the cost involved in battery manufacturing is compared with countries like China, USA, Germany, Sweden, Poland, Norway, France etc. The costs incurred for battery manufacturing from Vietnam is the 2nd lowest one with the lowest one being China. This sounds good for CATL to invest in Vietnam in battery manufacturing. Referring to exhibit 8, considering the present demands in Vietnam on cell manufacturing, the minimum amount for investment stands out to be \$241 million excluding the cost invested by the competitors in Vietnam. The total cost of battery production can be brought down to \$120/kWh from \$137/kWh through CATL's strategic mode of investment.

## Conclusion

CATL's investment case study in the lithium-ion battery supply chain across Indonesia, Thailand, and Vietnam reveals a landscape ripe with potential for sustainable energy solutions. With Mr. John Chen's astute guidance, CATL has strategically navigated the intricate market dynamics, considering political factors, regulatory environments, and market-specific needs.

The ASEAN region's fervent embrace of electric mobility and renewable energy, coupled with CATL's commitment to innovation, positions the company as a key player in the region's electrification revolution. Investments in refining battery-grade chemicals, expanding cell manufacturing capacity, and forging strategic partnerships illustrate CATL's dedication to bolstering the entire battery value chain.

While challenges such as ESG concerns and initial capital costs loom, the investment case study underscores the tremendous opportunities for CATL to reinforce its market leadership in ASEAN's sustainable energy landscape. By leveraging its expertise and technological advancements, CATL stands poised to carve a brighter, greener future for the region and the global lithium-ion battery industry.

**Questions:**

1. At which stage of the value chain should Mr. John Chen invest in Indonesia to maintain its competitive advantage, considering the country's policies, and commitment to becoming a top battery & component manufacturing hub, with a competitive landscape?
2. Considering the potential of the Thai EV Market and the existing presence of CATL in neighbouring Indonesia, is it better for CATL to invest and establish independently within Thailand or partner up with local players instead to leverage existing branding, relationships, and government incentives?
3. Considering the competitors present in Vietnam for the battery pack and cell manufacturing, what would be the strategic action plan from CATL for investing \$241 million by addressing the gap in the supply chain considering the EV projections in Vietnam?



## Appendix

### Growth Potential in ASEAN countries

CATL is now the world's largest battery maker, and it is looking to expand its production capacity even further. In order to do this, CATL is exploring investment opportunities in the lithium-ion battery supply chain in ASEAN countries.

There are several reasons why CATL is interested in investing in ASEAN countries. First, these countries have abundant natural resources that are essential for the production of lithium-ion batteries, such as lithium, cobalt, and nickel. Second, ASEAN countries have a relatively low cost of labour, which will help CATL to reduce its production costs. Third, ASEAN countries have a growing automotive industry, which will provide CATL with a large market for its batteries.

CATL has already made several investments in ASEAN countries. In 2018, the company invested in a lithium mine in Indonesia. In 2019, CATL invested in a battery factory in Thailand. And in 2020, CATL invested in a battery research and development centre in Malaysia.

These investments are part of CATL's strategy to become the world's leading battery maker. By investing in ASEAN countries, CATL is securing access to essential resources, reducing its production costs, and expanding its market share.

The investment opportunities in the lithium-ion battery supply chain in ASEAN countries are significant. The region has the resources, the labour force, and the growing automotive industry to support a large-scale battery manufacturing industry. CATL is well-positioned to take advantage of these opportunities and become the world's leading battery maker.

### Challenges and Regulations in ASEAN Countries

As CATL seeks to expand its presence in ASEAN countries, it will encounter specific challenges and regulatory considerations, which have been evident from real-life examples and government announcements:

- **Regulatory Landscape:** Each ASEAN country has its own unique regulatory framework for the electric vehicle and battery industries. For instance, in Indonesia, the government announced the "Battery for Indonesia" initiative aimed at promoting local battery production and reducing dependence on imports. To comply with such regulations, CATL may need to establish local manufacturing facilities or form partnerships with local companies.
- **Local Competition:** In Thailand, local battery manufacturers have been making strides in the EV market. One such example is Energy Absolute Public Company Limited (EA), a Thai company that has made significant investments in renewable energy and EV charging infrastructure. As CATL enters the Thai

market, it will need to differentiate itself from established local players like EA to gain a competitive edge.

- **Raw Material Supply:** ASEAN countries, including Indonesia, are rich in mineral resources like nickel and cobalt, crucial components for battery production. The Indonesian government has implemented regulations to encourage the development of domestic nickel smelting. CATL may need to work closely with local mining companies or invest in nickel refining facilities to secure a stable supply chain.
- **Infrastructure Development:** Governments in ASEAN countries are investing in EV charging infrastructure to support the adoption of electric vehicles. For instance, the Thai government announced a plan to increase the number of charging stations across the country to 400,000 by 2025. CATL could collaborate with governments and utilities to support these infrastructure development initiatives, ensuring seamless integration of electric mobility.
- **Market Localization:** Each ASEAN country has its unique market preferences and consumer behaviours. For example, in Vietnam, motorcycles remain the primary mode of transportation, and electric two-wheelers are gaining popularity. CATL may need to tailor its product offerings to cater to the specific demands of the Vietnamese market, focusing on providing high-quality batteries for electric scooters.
- **Environmental Regulations:** Governments in ASEAN countries are increasingly emphasising environmental sustainability. For instance, Indonesia's Ministry of Environment and Forestry issued regulations on battery waste management, aiming to ensure proper disposal and recycling of used batteries. CATL must comply with these regulations and invest in responsible battery recycling facilities.

## Vietnam's Competitive Landscape

The corporations in Vietnam that are engaged in the production of batteries are listed below.

### 1. SHENG CHANG TECH CO., LTD. [36]

The company, which primarily produces Sealed Lead Acid (SLA) batteries, was founded in 2006. Batteries are primarily used in the 6V and 12V range, where they meet the demand for powering electrical accessories.

### 2. Vision Group [37]

The VISION GROUP was established in 1994, and Shenzhen is home to its headquarters. One of the biggest battery producers in the world is VISION GROUP. The items are divided into two groups: lithium-ion batteries and valve-regulated lead acid batteries. The Lithium-ion Battery includes the Lithium Cobalt Oxide Series, Lithium Manganese Oxide Series, and Lithium Iron Phosphate Series; the VRLA Battery contains the AGM Series, Deep Cycle Series, Pure Lead Series, and Gel Series.

### 3. PINACO [38]

Manufacturing of dry cells is done at PINCAO. Dry cell batteries and storage batteries have been PINACO's two primary product categories since the company was founded in 1976 and became public in 2004. Con O (Eagle) dry cell batteries from the corporation are well-liked by customers and are frequently used in home applications such as flashlights, watches, rechargeable lamps, electronics, and children's toys. These items are produced using manufacturing chains using paper-lined technologies that are imported from Germany, the Republic of Korea, and China. This helps to boost competitiveness while also guaranteeing high capacity, safety, non-leakage, and an affordable price. The business has established itself as a key link in the manufacturing of cars and motorcycles thanks to its high-quality products. In 2003, the company reached a significant turning point when it was named the exclusive storage battery supplier for Ford Mondeo vehicles. Since then, vehicle manufacturers including Mercedes-Benz Vietnam, Mazda, Suzuki, Kia, Thaco, Samco, Hyundai, and motorbike agents like Honda Vietnam, Piaggio Vietnam, and Yamaha Vietnam have chosen the company's products.

### 4. GS Battery Co. Ltd [39]

A joint venture between GS-Yuasa Corporation, the largest manufacturer of lead acid batteries in Asia, GS Battery Taiwan, and Mitsubishi Corporation, the largest trading conglomerate in Japan, GS Battery Vietnam Co., Ltd. is a corporation with 100% foreign capital.

### 5. Heng Li Vietnam Battery Technology Co. Ltd [40]

JIANGXI Heng Li TECHNOLOGY BATTERY CO., LTD. was founded in July 2002 with a 100 million yuan registered capital. Heng Li established Heng Li (VIETNAM) BATTERY TECHNOLOGY CO., LTD in the Vietnamese province of Dong Nai's Nhon Trach district in 2015 with an investment of 25 million dollars. By the end of 2017, manufacturing had already begun at this new factory, which includes a cutting-edge production line with an annual production capacity of 200 million KVAh in valve-regulated sealed lead-acid batteries. Vietnam Heng Li, a subsidiary of Jiangxi Heng Li Battery, will undoubtedly mark yet another significant turning point in the growth of our business. Our main products include fixed-type valve-regulated sealed lead-acid batteries, small valve-regulated lead-acid batteries, sealed lead-acid batteries for electric bikes, gel batteries, and lead-acid batteries for motorcycles. These products are widely used in telecommunications, emergency lighting, financial systems, solar energy systems, alarm systems, and other areas. Heng Li has earned certifications for his products, including the export product quality license, the ISO 9001 quality management system certification, the UL, CE, Thail, CTL, and Golden Sun certifications.

## 6. SAITE Power Source Vietnam Ltd [41]

Incorporated in 2017, Saite Power Source (Vietnam) Co., Ltd. debuted its operations in 2019. It has a 6-hectare-sized lead plate manufacturing and battery assembly facility with an annual production capacity of 2,500,000 KVAh and a sales volume of roughly 130,000,000 USD. Its primary offering, the VRLA battery, is extensively utilised in UPS, security and alarm systems, telecom, power plants, and solar or wind renewable energy systems, among other applications.

Saite Power Source (Vietnam) Co., Ltd. is a subsidiary of Fujian Minhua Power Source Co., Ltd., one of the top exporters and manufacturers of VRLA batteries in China with over 20 years of expertise in battery design and production.

Saite Power Co. has implemented a quality management system that complies with international standards ISO9001 and ISO14001. Its primary objective is to meet and exceed customer expectations. Its entire product line is UL and CE-certified. In addition to the quality that is guaranteed, you can rely on our committed staff to provide you with customised goods, any necessary technical assistance, and value-added services.

Saite Power will be your trustworthy business associate and will consistently create high-quality battery-to-power products for all of our clients all over the world.

## Tables

Table 1: Electric cars and buses in Vietnam considered for this study

Model Name	Battery capacity (kWh)
VF 9	95
VF 6 Eco & Plus	59.6
VF 7 Eco & Plus	75.3
VF 8	82
VFe36	106
VFe34	42
Ebus	281

Table 2: LFP cells from CATL

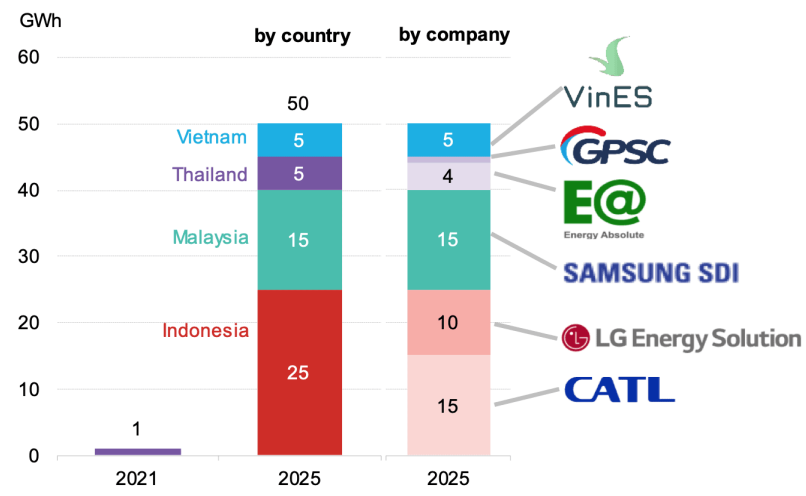
CATL LFP chemistry	Cell A [26]	Cell B [27]	Cell C [28]	Cell D [29]
Weight (kg)	0.373	445	2.95	50
Energy (Wh)	64	7000	480	5120
Lower limit specific energy (Wh/kg)	90	90	90	90
Upper limit specific energy (Wh/kg)	120	120	120	120
Required GWh according to Vietnam demand	2.0107	2.0107	2.0107	2.0107
Number of cells required according to Vietnam demand	31417188	287243	4188958	392715

Table 3: NMC cells from CATL

CATL NMC chemistry	Cell A [30]	Cell B [31]	Cell B [32]	Cell D [33]
Weight (kg)	0.85	1.2	1.72	2.61
Energy (Wh)	182.5	240.5	344.1	566.1
Lower limit specific energy (Wh/kg)	220	220	220	220
Upper limit specific energy (Wh/kg)	240	240	240	240
Required GWh according to Vietnam demand	2.0107	2.0107	2.0107	2.0107
Number of cells required according to Vietnam demand	11017534	8360499	5843360	3551846

## Exhibits

Exhibit 1: Cell manufacturer's share in the ASEAN market



Source: BloombergNEF, company press releases, news articles. Logos from company website.

Exhibit 2: Raw material supply chain in Indonesia

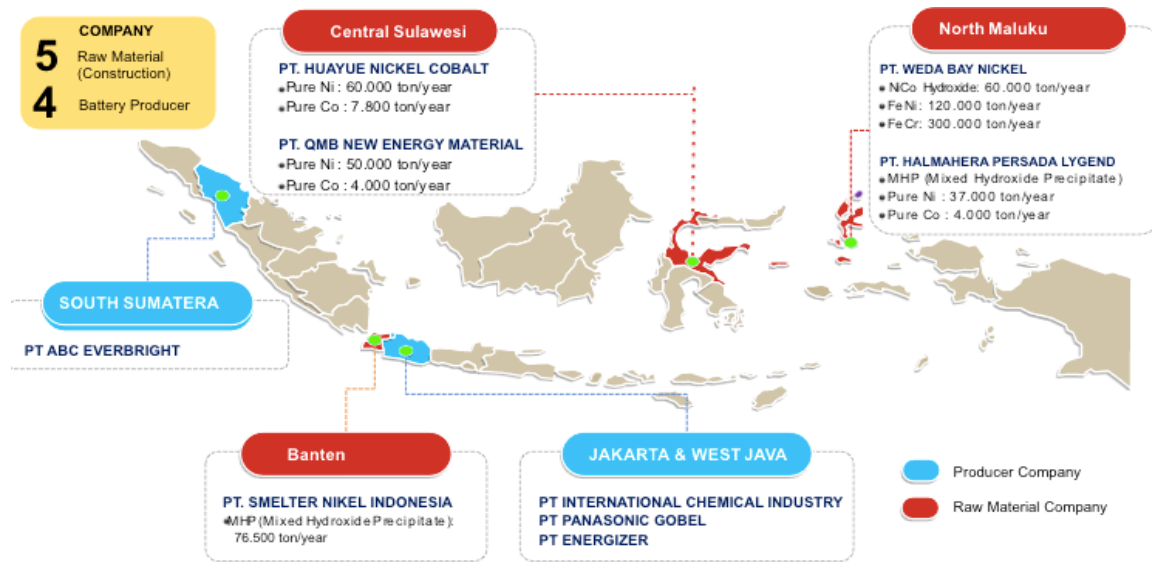


Exhibit 3: Investments in Vietnam to Promote E-mobility [42-43]

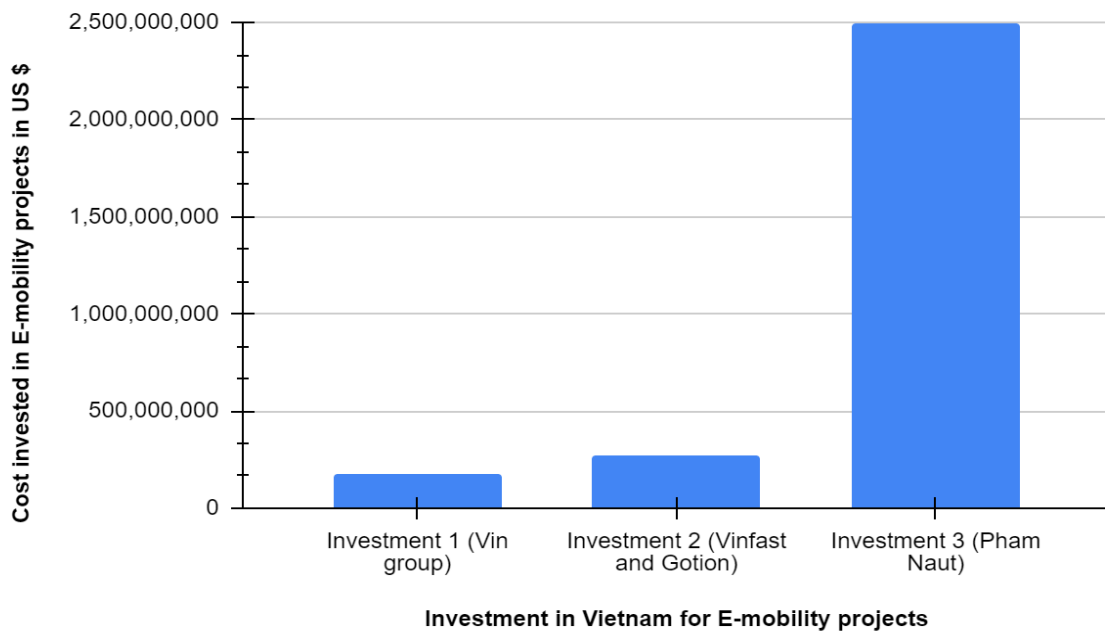




Exhibit 4: LFP cells considered from CATL

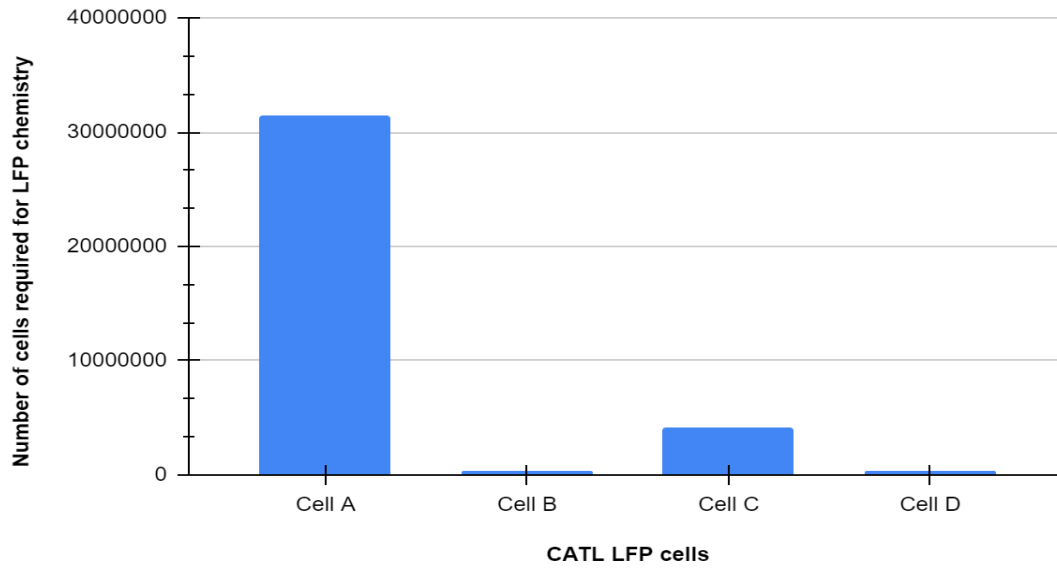


Exhibit 5: NMC cells considered from CATL

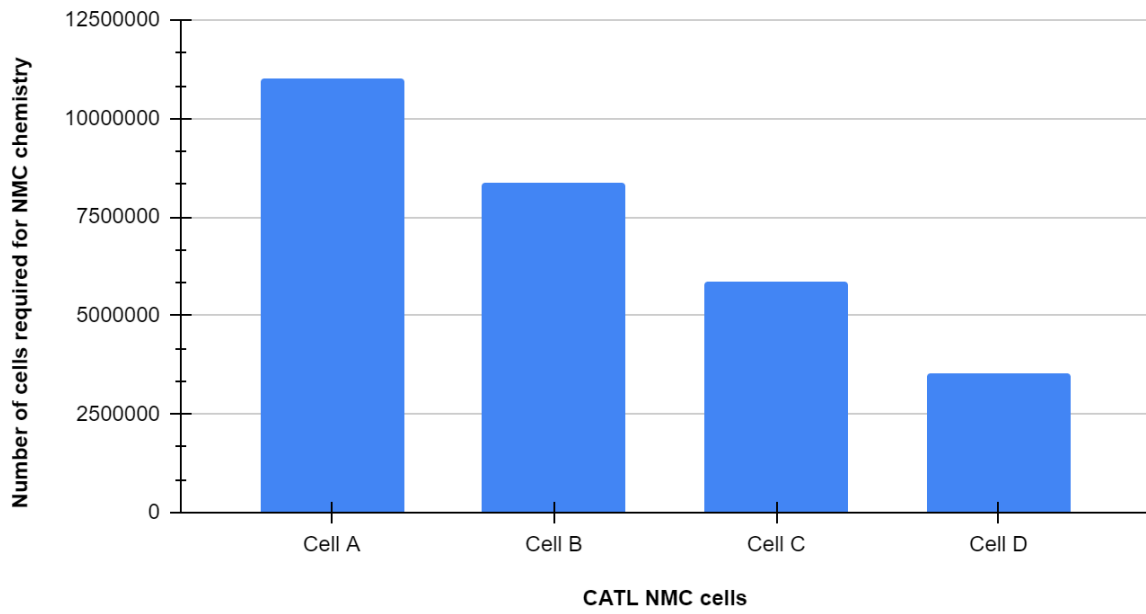


Exhibit 6: Cost of battery comparison - a comparison on other countries [44]

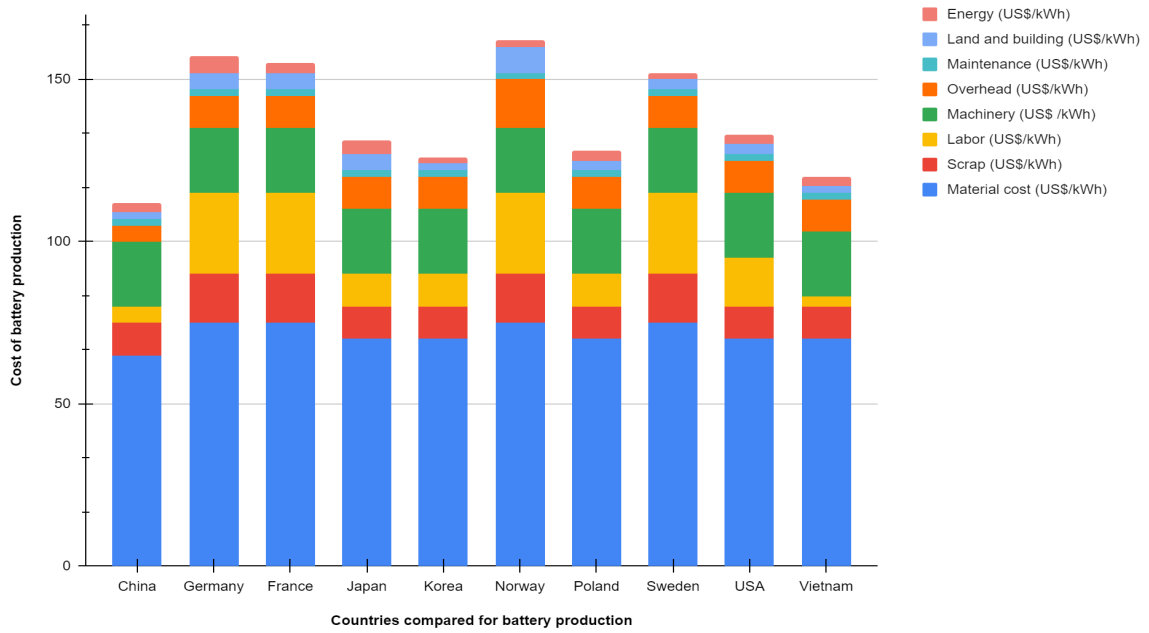


Exhibit 7: Total cost of battery production comparison with other countries

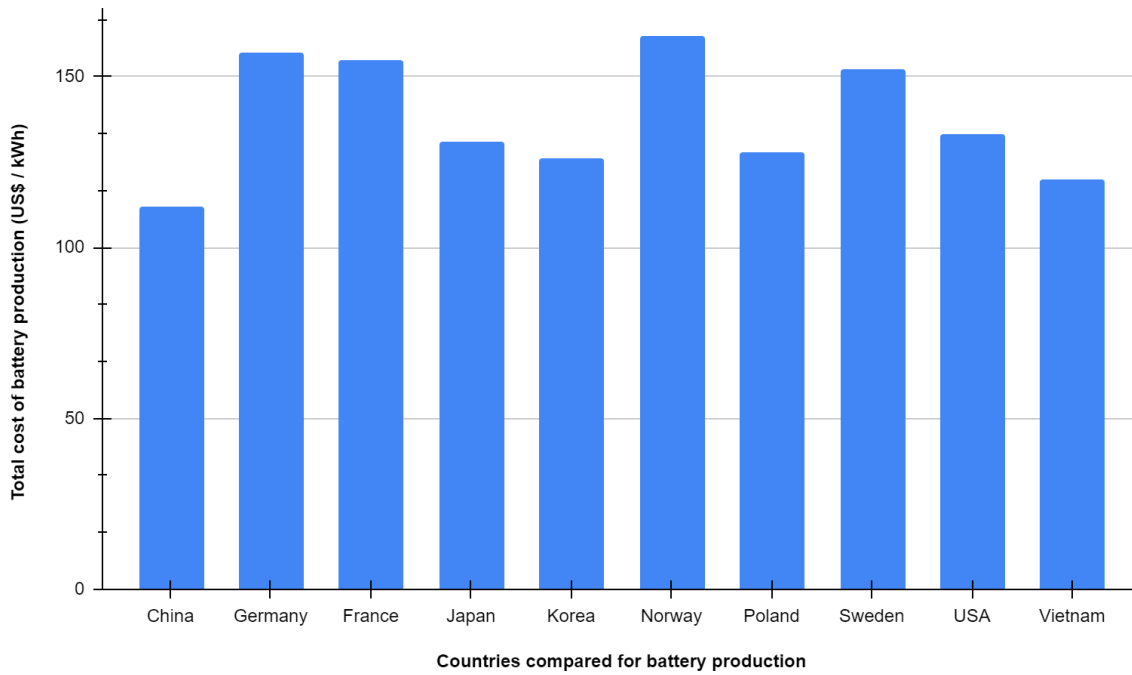
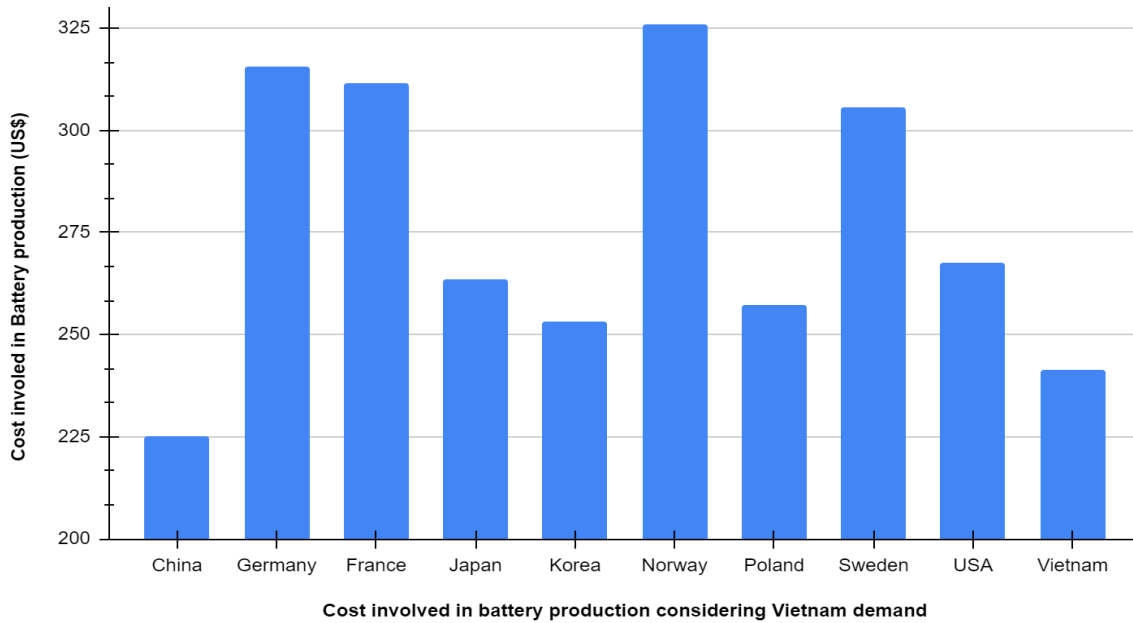


Exhibit 8: Comparison of the cost involved in battery production considering Vietnam demand



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