

11 JANUARY 2021

THAILAND UTILITIES

Thailand EV: Recharging for a full discharge

4 ความเปลี่ยนแปลงสำคัญในด้านกฎระเบียบเพื่อส่งเสริมอุตสาหกรรมยานยนต์ไฟฟ้าในประเทศไทย

ในช่วง 12 เดือนที่ผ่านมา รัฐบาลไทยได้ออกนโยบายสำคัญหลายประการ โดยมีจุดมุ่งหมายหลักในการส่งเสริมและเร่งปฏิรูปอุตสาหกรรมยานยนต์จากที่เคยมุ่งเน้นไปที่รถยนต์ที่ใช้เครื่องยนต์สันดาปภายในเป็นรถไฟฟ้า ประกอบด้วย 1) ภาษีสรรพสามิตที่ต่ำลงสำหรับรถไฟฟ้า; 2) มาตรการส่งเสริมการลงทุนในโครงการพัฒนาระเบียงเศรษฐกิจพิเศษภาคตะวันออก (EEC); 3) การอนุมัติอัตราค่าไฟในระดับต่ำที่ 2.63 บาทต่อ kWh สำหรับสถานีชาร์จรถไฟฟ้า; และ 4) มาตรการกระตุ้นทางภาษีสำหรับแผนการลงทุนในการผลิตรถไฟฟ้า มาตรการส่งเสริมการลงทุนใหม่ดังกล่าวมาแทนมาตรการแรก ซึ่งหมดอายุไปในปี 2018 และครอบคลุมยานยนต์ไฟฟ้าทั้งหมด กล่าวคือ รถยนต์โดยสาร รถเมล์ รถกระบะ รถมอเตอร์ไซค์ รถสามล้อ และเรือ

ปัจจุบันประเทศไทยพร้อมเดินทางสู่การปฏิรูปอุตสาหกรรมยานยนต์ไฟฟ้า

ในช่วง 9M20 ตัวเลขรถยนต์ใหม่ในประเทศไทยที่ใช้กระแสไฟฟ้าจากแบตเตอรี่ในการขับเคลื่อนเพียงอย่างเดียว (BEVs) เพิ่มขึ้นอย่างเห็นได้ชัดเป็น 2,267 คัน ตัวเลขดังกล่าวคิดเป็น 9.0% ของยานยนต์ไฟฟ้าใหม่ทั้งหมด โดยเพิ่มจาก 1,572 คัน (4.9% ของจำนวนยานยนต์ไฟฟ้ารวม) ในปี 2019 และ 325 คัน (1.6%) ในปี 2018 ตัวเลข BEVs รถยนต์ไฮบริด (HEVs) และรถยนต์ไฮบริดแบบเสียบปลั๊กชาร์จไฟได้ (PHEVs) ในประเทศไทยมีจำนวนรวม 166,000 คันคิดเป็น 24% ของยอดขายรถยนต์ในประเทศรวม ณ สิ้นช่วง 9M20 จากแผนพัฒนากำลังการผลิตไฟฟ้าของประเทศไทยในปี 2018 ในระยะยาว ประเทศไทยมีเป้าหมายเพิ่มยอดขายรถยนต์ไฟฟ้าเป็นเกือบ 3 ล้านคันภายในปี 2030 เพิ่มขึ้นจากที่เคยมีเพียง 100 คันในปี 2018 นอกจากนี้รัฐบาลยังตั้งเป้าให้ 30% ของการผลิตยานยนต์ในประเทศเป็น BEVs และ PHEVs ในปี 2026-30 หรือเท่ากับ 0.7 ล้านคันจากคาดการณ์ของเรา จากตัวเลขดังกล่าว 60,000-110,000 คันจะใช้ในภาคสาธารณะและภาคขนส่ง

การแข่งขันระหว่าง NMC battery ของ EA กับ Semi-solid battery ของ GPSC

เราเชื่อว่า NMC-based batteries ของ EA ซึ่งมีต้นทุนต่ำและความสามารถในการทนความร้อนสูง จะทำให้บริษัทสามารถเจาะตลาดรถไฟฟ้าและสถานีชาร์จทั่วประเทศและต่างประเทศ EA วางแผนลดต้นทุนการผลิตของบริษัทอย่างช้า ๆ จาก USD140-150/kWh เมื่อเริ่มโรงงานผลิตแบตเตอรี่ขั้นที่ 1 ขนาด 1GWh ในช่วง 2Q21 ให้ต่ำกว่า USD120/kWh แผนดังกล่าวมีแนวโน้มช่วยให้กำไรสุทธิของ EA จากธุรกิจแบตเตอรี่และกลุ่มธุรกิจEV เพิ่มขึ้นอย่างมีนัยสำคัญในปี 2021-22 ในขณะที่เราเห็นว่าโรงงานผลิตแบตเตอรี่ Semi-solid state นำร่องของ GPSC กำลังการผลิต 0.03GWh ซึ่งมีกำหนดดำเนินงานเชิงพาณิชย์ในช่วง 2Q21 อาจเป็นปัจจัยหนุนการเติบโตในระยะยาวให้แก่บริษัท

เลือก EA จากธุรกิจรถไฟฟ้าและ GPSC จากการเป็นผู้ผลิตไฟฟ้ารายเล็กและโอกาสที่ผลการดำเนินงานจะดีเกินคาดจากธุรกิจแบตเตอรี่

เรามองว่าราคาหุ้นของทั้ง EA และ GPSC ซึ่งเป็นผู้นำในธุรกิจรถไฟฟ้าและแบตเตอรี่ในประเทศไทย จะยังปรับตัวได้ดีในปี 2021 จากแนวโน้มการเติบโตของกำไรสุทธิที่ดีในปี 2021-22 เราเชื่อว่าราคาหุ้นของ EA มีแนวโน้มเคลื่อนไหวตามราคาหุ้นของบริษัทยานยนต์ไฟฟ้าระดับโลก อันประกอบด้วยผู้ผลิตรถไฟฟ้าสำคัญสองราย กล่าวคือ Tesla และ NIO และผู้ผลิตรถกระบะไฟฟ้าหนึ่งราย (Workhorse) ซึ่งสะท้อนถึงความมั่นใจและความนิยมของนักลงทุนและผู้ผลิตรถไฟฟ้า รถเมล์ไฟฟ้า และรถกระบะไฟฟ้า



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A step closer to becoming a key hub for EV

According to the Bangkok Post newspaper on 4 Nov-20, Thailand's Board of Investment (BOI) finally approved the rollout of a comprehensive set of incentives covering all major aspects of the electric vehicle (EV) supply chain, with a focus on battery electric vehicles (BEVs), the local production of critical parts, and the inclusion of commercial vehicles of all sizes, as well as ships. The board also approved THB35.7b (USD1.1b) worth of large investment projects in several sectors.

In the past 12 months the Thai government has issued a number of key policies aimed at promoting and accelerating the transformation of the automotive industry from its focus on internal combustion engine (ICE) vehicles to EVs.

Policy #1 (2020): Lower excise taxes for Thailand's EV cars and E-buses. In 2016, Thailand changed its excise tax structure from an engine power-based (cc-based) to a carbon dioxide (CO₂) emission-based tax scheme. EV cars have benefitted the most from the excise tax changes, with the excise tax dropping from 10% to 8% for EV cars, and to 2% for EV cars produced in Thailand at plants with BOI privileges. EA falls into the 2% excise tax bracket for its SPA1 cars and E-buses. Hence, we expect lower price tags for EA's E-buses and SPA1 cars, at THB1m-1.2m per car, which will likely be one of the key reasons for EA's sales volume growth that we project from 2020 onward.

Exhibit 1: Thailand's automotive tax structure

Old rate based on engine size Tax structure before 1 Jan 2016			New rate based on CO ₂ emissions Tax structure implemented from 1 Jan 2016				Adjusted rate based on CO ₂ emissions Tax structure according to recommended retail price			
Auto type	Engine (litre)	Tax rate (%)	Auto type	CO ₂ (g/gm)	Tax rate			Tax rate		
					E10/E20	E85/NGV	Hybrid	E10/E20	E85/NGV	Hybrid (BOI)
Passenger car (below 10)	2.5 - 3.0	40	Passenger car (below 10)	≤ 100	30*	25*	10	25*	20*	8* / 4*
	2.0 - 2.5	35		101 - 150			20			16 / 8
	< 2.0	30		150 - 200	35	30	25	30	25	21 / 10.5
	> 3.0	50		> 200	40	35	30	35	30	26 / 13
				> 3,000 CC	50	50	50	40	40	40
PPV		20		≤ 100 (HV)	23* / 10			18* / 8		
Eco car		17		≤ 200	25* / 12 / 5 / 3, 18			20* / 10 / 4 / 2.5, 15		
Electric hybrid		10	PPV	> 200	30 / 15 / 7 / 5, 18			25 / 13 / 6 / 4, 17		
E20		(5)	DC	> 3,250 CC	50			40		
			Space cab	≤ 100	14* / 12*			12* / 10*		
			Pick-up	101 - 120	17			14		
			Electric vehicle		10 / 2			8 / 2		
			Fuel cell/ EV (BOI)							

*Active safety for passenger cars of below 10 passengers with CO₂ ≤ 150g/km / PPV with CO₂ ≤ 200g/km / Eco car with CO₂ ≤ 100g/km

Sources: Excise Tax Department; Fiscal Policy Office

Policy #2 (2020): EEC investment campaign. The EV industry, including EV cars, E-buses, and battery plants, is one of the 12 industries being focused on under Thailand's Eastern Economic Corridor (EEC) investment campaign. We think the tax privileges, plant zoning, and favourable regulations for EV car sales in Thailand will help accelerate the sales of EA's EV cars and E-buses.

Policy #3 (Sep-20): Legalising the low electricity cost of THB2.63/kWh for EV charging stations. After the Thai government’s approval of the standard cost of electricity for all EV charging stations at THB2.63/kWh for the off-peak tariff, which is lower than the average THB3.2/kWh and the on-peak tariff of THB4.3/kWh, the number of EV charging stations has started to increase.

According to the Electric Vehicle Association of Thailand (EVAT), the country now has a total of 647 charging stations as of Nov-20, led by private sector companies. EA has 405 stations, followed by other state-owned enterprise (SOE) operators, including PTT (PTT TB, BUY, TP THB60; 25 stations), the Provincial Electricity Authority of Thailand (PEA, 11), and the Electricity Generating Authority of Thailand (EGAT, 10).

Exhibit 2: Number of EV charging stations in Thailand (November 2020)



* Chargers have been installed and will be opened soon.
 * ผู้จัดบริการสถานีได้มีการติดตั้งแล้วแต่คาดว่าจะยังไม่เปิดให้บริการในเร็วๆ นี้

Source: EVAT

Policy #4 (4 Nov-20): A tax-incentive package for the EV investment scheme. The new promotion package, which replaces the first EV package that expired in 2018, covers a comprehensive range of electric vehicles, namely passenger cars, buses, trucks, motorcycles, tricycles, and ships. Incentive schemes for these different types of electric vehicles can be summarised as follows:

Four wheelers: Qualified projects with a total investment package worth at least THB5b will be granted a 3-year tax holiday for plug-in hybrid EVs (PHEVs), but as for BEVs, an 8-year corporate income tax exemption period will be offered and will be extendable for R&D investments/expenditures. As for qualified projects with total investments worth less than THB5b, 3-year tax holidays will be granted for PHEVs and BEVs, but the tax holiday period for BEVs can be extended if the project meets the set requirements, such as production commencing by 2022, additional parts are produced, the minimum production level of 10,000 units within three years is reached, and there are R&D investments/expenditures.

Motorcycles, three-wheelers, buses and trucks: Qualified projects will be granted a 3-year corporate income tax exemption, extendable if additional requirements are met.

Electric powered ship production projects: Vessels with less than 500 gross tonnage will be eligible for an 8-year corporate income tax exemption.

EV parts: The BOI also approved the addition of four more EV parts to the list of critical parts, namely high voltage harnesses, reduction gear, battery cooling systems and regenerative braking systems. These four categories will all receive 8-year corporate tax exemptions.

EV batteries: To promote local EV battery production, the BOI also approved additional incentives to produce both battery modules and battery cells for the local market by granting a 90% reduction on import duties for two years on raw or essential materials not available locally.

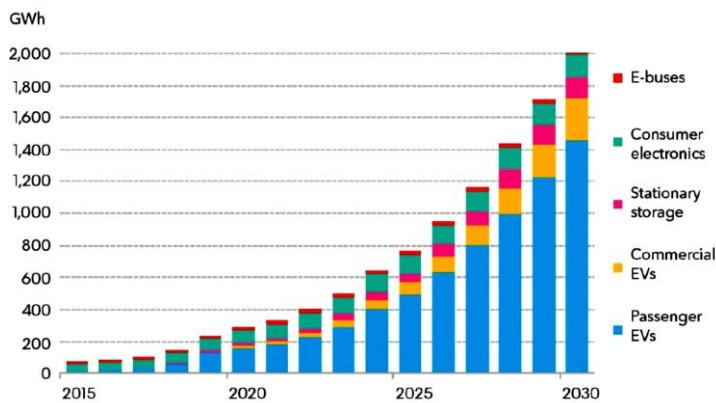
The BOI previously approved 26 projects producing EVs of various types, including five hybrid electric vehicle (HEV), six PHEV, 13 BEV, and 2 E-bus projects, with a combined production capacity of over 566,000 units per year, according to BOI data. As of Dec-20, seven of those projects have started commercial operations, namely major players like Nissan, Honda and Toyota for HEVs; Mercedes Benz and BMW for PHEVs; and newcomers FOMM and Takano for BEVs. The agency also approved 14 projects to make critical parts for EVs, including 10 battery production projects.

We believe these four key policies, including the BOI's latest investment incentive package, are likely to accelerate the development of Thailand's EV production and related supply chains.

Solid industry demand growth

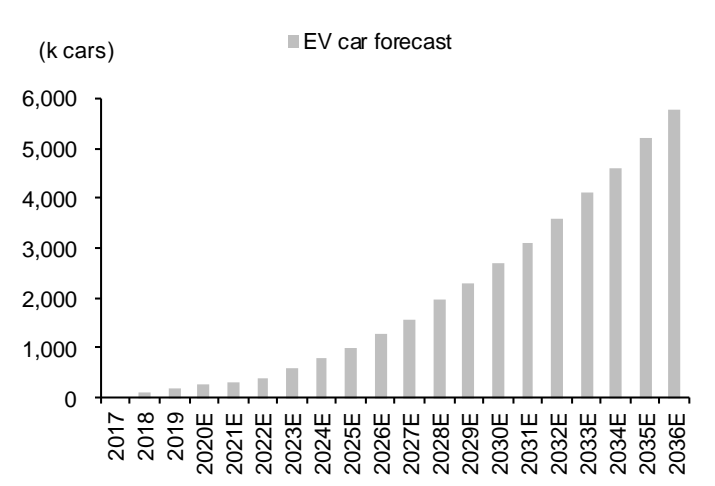
According to Bloomberg, global EV car sales could rise substantially during 2020-30, growing tenfold within 10 years. Thailand, according to the Power Development Plan 2018 (PDP 2018), aims to grow its EV car sales to almost 3m cars by 2030, up from a mere 100 cars in 2018, and the government is aiming for 30% of the country’s vehicle production to be BEV and PHEV in 2026-30, equivalent to 0.7m cars, based on our estimate. Of this, 60k-110k would be EVs used in the public and transportation sectors.

Exhibit 3: Annual global lithium-ion battery demand



Source: BloombergNEF

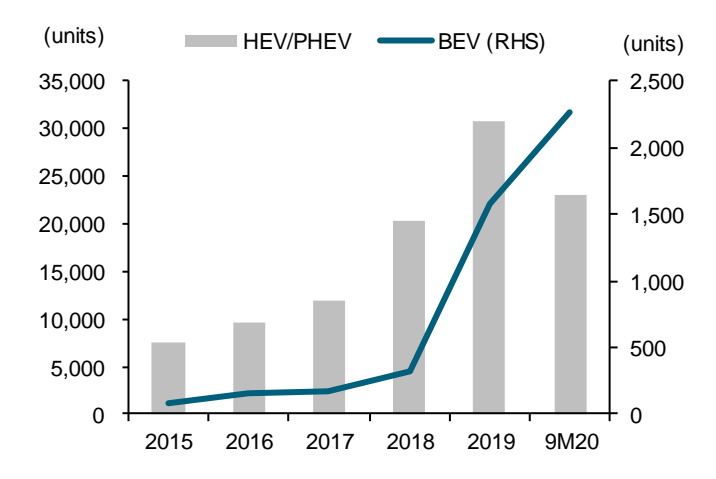
Exhibit 4: EV car projections under PDP 2018



Source: Power Development Plan 2018 (PDP 2018)

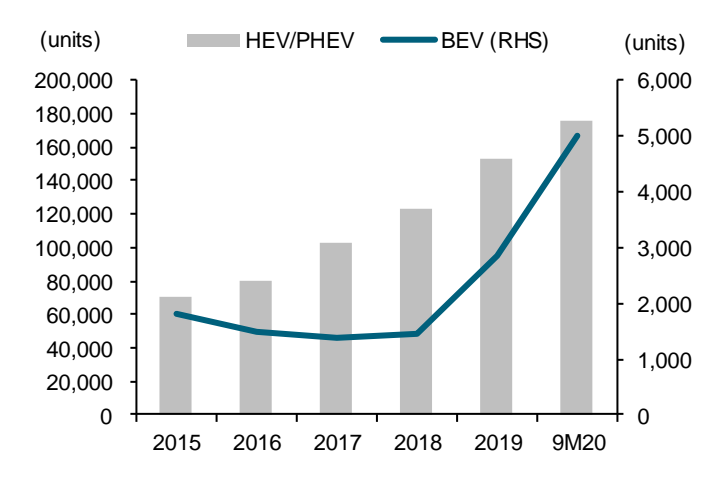
According to EVAT, while the number of BEVs remains low with registered BEVs in 2018 to Jun-20 totalling 4,301 – comprising 2,301 E-bikes, 1,731 EV cars, 120 E-buses, and 149 E-tricycles (Tuk-Tuks) – HEVs and PHEVs amounted to 167,767, comprising 162,192 cars, 5,573 motorbikes, one bus and one truck.

Exhibit 5: New EV registrations between 2015-9M20



Source: EVAT

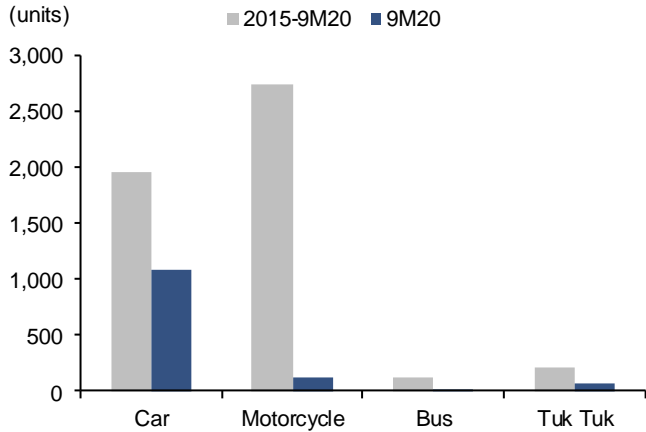
Exhibit 6: Accumulated EV registrations between 2015-9M20



Source: EVAT

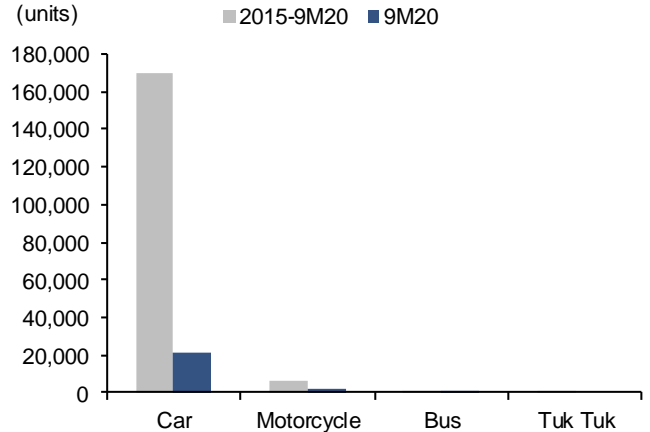
In the past few years most EVs were not the fully battery powered BEVs but the semi- or quasi-battery powered HEVs and PHEVs. However, in 9M20, the number of new BEVs in Thailand jumped markedly to 2,267, accounting for 9.0% of all new EVs, up from 1,572 BEVs (4.9% of total EVs) in 2019 and 325 BEVs (1.6%) in 2018.

Exhibit 7: Number of new BEVs in Thailand jumped markedly in 9M20 vs new BEVs during 2015-9M20



Source: EVAT

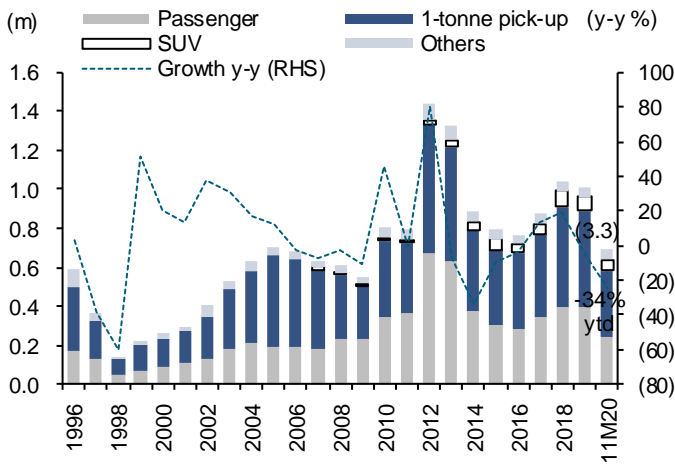
Exhibit 8: Total number of HEVs/PHEVs in Thailand has been relatively small in 9M20 vs during 2015-9M20



Source: EVAT

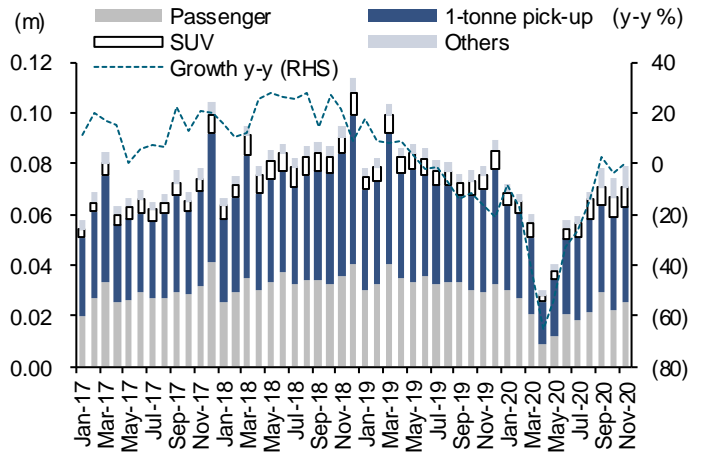
The 166k BEVs, HEVs, and PHEVs in Thailand represented 24% of the country's total domestic car sales as of 9M20. Most of Thailand's new vehicles are still ICE vehicles, with 50% of the total cars sold in the domestic market in 11M20 being 1-tonne pick-ups and 34% passenger cars. The number of cars sold in Thailand has already rebounded from its bottom at 30k in Apr-20, dropping 65% y-y, up to 79k in Nov-20, a decline of only 0.2% y-y. This reflects the highly resilient demand for automobiles in Thailand, in our view.

Exhibit 9: Thailand's annual car sales



Source: Thailand Automotive Institute

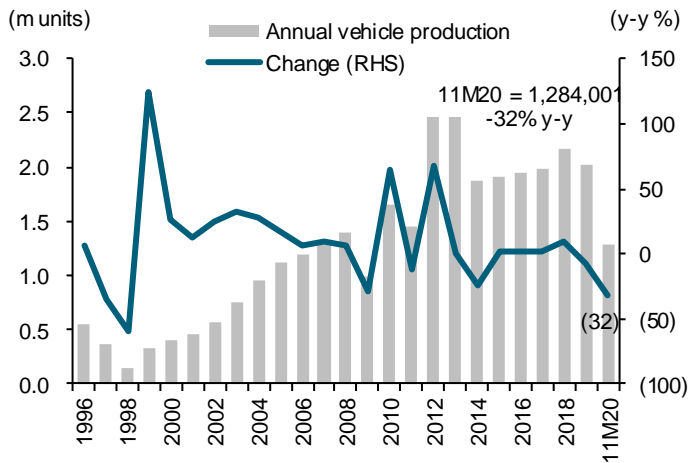
Exhibit 10: Thailand's monthly car sales



Source: Thailand Automotive Institute

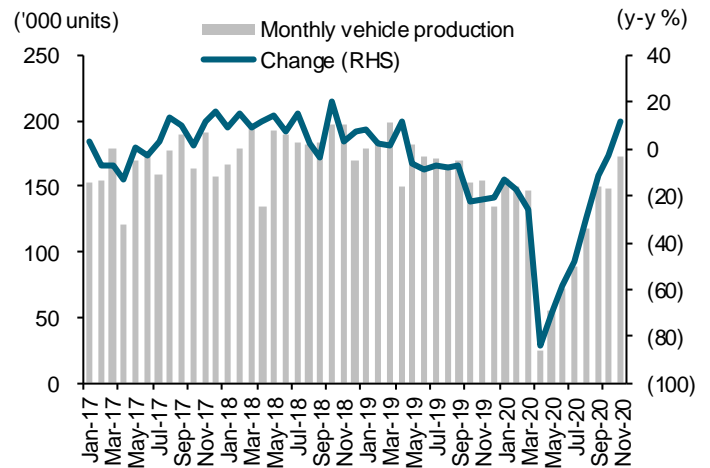
Similarly, car production in Thailand has sharply recovered from only 24k units in Apr-20 (-84% y-y) to 172.5k in Nov-20 (+12% y-y), driven mainly by the higher number of cars produced for export markets, thanks to Thailand's effective management of the COVID-19 outbreak that allowed most car manufacturing plants to quickly resume production for both the domestic and export markets.

Exhibit 11: Thailand's annual car production



Source: The Federation of Thai Industries (FTI)

Exhibit 12: Thailand's monthly car production



Source: The Federation of Thai Industries (FTI)

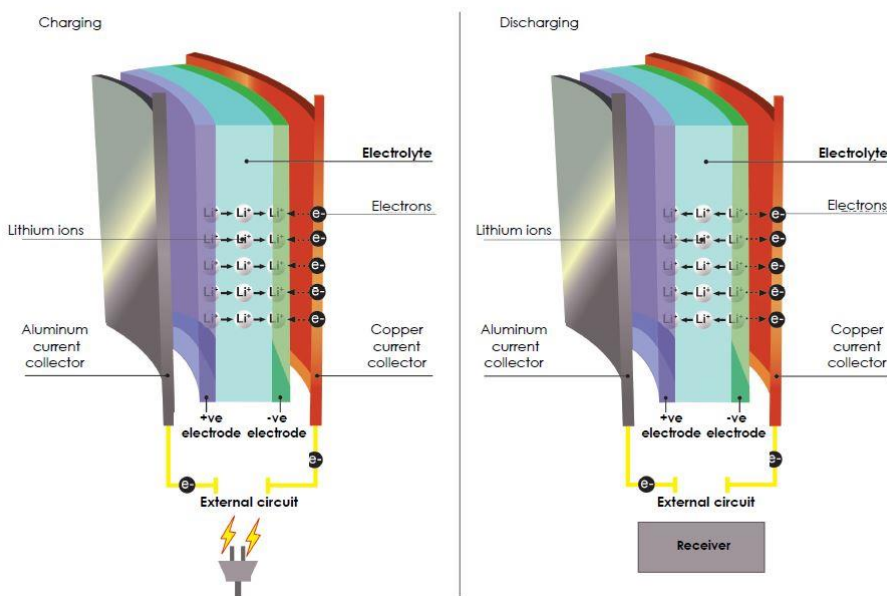
Battery technology

A lithium-ion battery (Li-ion) is a type of rechargeable battery and is currently the most popular battery for a wide number of applications, including many portable electronics and EVs. Commercially developed by a Sony team in 1991, Li-ion works by moving the lithium ions from the negative electrode through an electrolyte to the positive electrode during discharge. When the battery is being charged up, Li+ lithium ions leave the positive electrode (cathode) and are stored in the negative electrode (anode). When it is discharged to produce an electrical current, the Li+ ions move in the opposite direction.

The core component of an Li-ion battery is a cell with an aluminium plate to collect the current, followed by the cathode, electrolyte, anode, and a copper plate.

Exhibit 13: How does the Lithium-ion battery work?

HOW A LITHIUM-ION CELL WORKS



Source: [BatteryUniversity](https://www.batteryuniversity.com)

While there are many battery technologies currently in use, there are two key battery technologies competing for widespread application in many industries.

Lithium iron phosphate battery (LFP) – Currently the most widely used in China, it has a lot of advantages, including low cost and high power. However, due to its low energy density the LFP battery is pre-eminently used for stationary energy storage applications, and LFP batteries are not suitable for fast charging.

Lithium Nickel Manganese Cobalt Oxide (NMC) – EA’s core battery, is increasingly becoming a more popular type of battery due to its higher energy density than LFP. Its most important advantage is its fast-charge capability, according to EA’s management. NMC is one of the most successful Li-ion battery type with a cathode combination of nickel-manganese-cobalt (NMC) material used as a coat on the cathode of the battery.

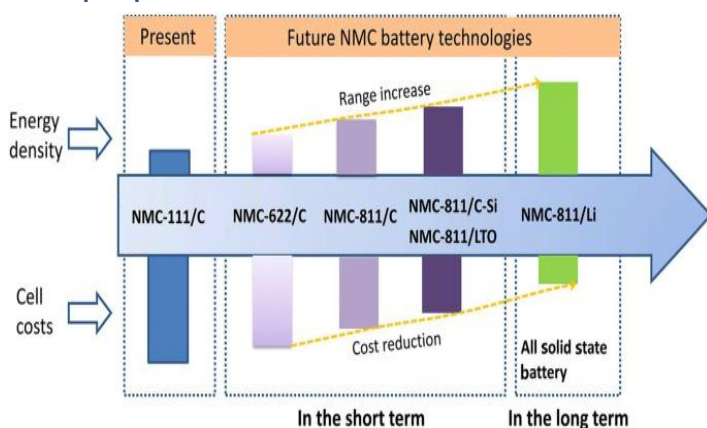
Exhibit 14: Summary of Lithium-based batteries

Chemistry	Lithium Cobalt Oxide (LCO)	Lithium Manganese Oxide (LMO)	Lithium Nickel Cobalt Aluminium Oxide (NCA)	Lithium Phosphate (LFP)	Lithium Titanate (LTO)	Lithium Nickel Manganese Oxide (NMC)
Cycle life (Ideal)	500-1,000	300-700	500	1,000-2,000	3,000-10,000	3,500-5,000
History	1991 (Sony)	1996	1999	1996	2008	2008
Applications	Mobiles phones, tablets, laptops, camera	Power tools, medical devices, powertrains	Medical, industrial, EV (Tesla)	Stationary with high current and endurance	UPS, EV, solar street lighting	E-bikes, medical devices, EVs, industrial
Comments	High energy, limited power. Market share has stabilised.	High power, less capacity, safer than Li-cobalt, often mixed with NMC to improve performance	Highest capacity with moderate power. Similar to Li-Cobalt.	Flat discharge voltage, high power low capacity, very safe, elevated self-discharge.	Long life, fast charge, wide temperature range and safe. Low capacity, expensive.	High capacity and high power. Market share is increasing. Also NCM, CMN, MNC, MCN
Electrolyte	Liquid	Liquid	Liquid	Liquid	Liquid	Liquid
AMITA’s products	NO	NO	NO	YES	YES	YES

Source: EA

Due to its very low self-heating rate or thermal runaway, NMC is most common in power tools and in power trains for vehicles (EV). Due to the high cost of cobalt, the cathode combination ratio of NMC has changed from 4:3:3 down to its current 8:1:1. EA’s battery technology is predominantly NMC-based technology. The low cost and high heat tolerance capabilities of NMC-based batteries make it possible for EA to penetrate the EV and utility market in Thailand and overseas, in our view.

Exhibit 15: Automotive Li-ion batteries – current status and future perspective

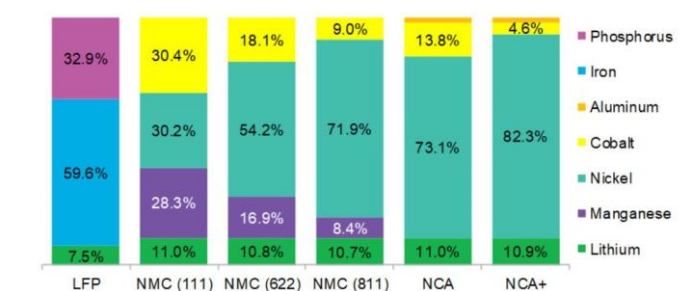


Source: EA

According to EA’s management, the company plans to gradually reduce its production costs from USD140-150/kWh when it starts up its first phase 1GWh battery plant in 2Q21, to below USD120/kWh. If the cost of battery cells, packaging, and battery management systems (BMS) are included, EA’s total battery cost could be cut from USD200/kWh down to USD150/kWh within the next 3-5 years, based on our estimate.

Exhibit 16: Metal component of batteries

Metal content of battery chemistries, by weight



Source: BloombergNEF

Source: BloombergNEF

Battery cost reduction. There are two key ways to cut the production cost of batteries. First, given that the cobalt cost is the highest cost component in NMC batteries, then the lower the cobalt content, the lower production cost. Initially NMC batteries contained around 1/3 portions equally of nickel, manganese, and cobalt, but the industry has gradually and successfully reduced battery costs by lowering the cobalt content from a 1/3 proportion down to 1/10 of the total material cost.

Exhibit 17: Manganese price



Source: Bloomberg

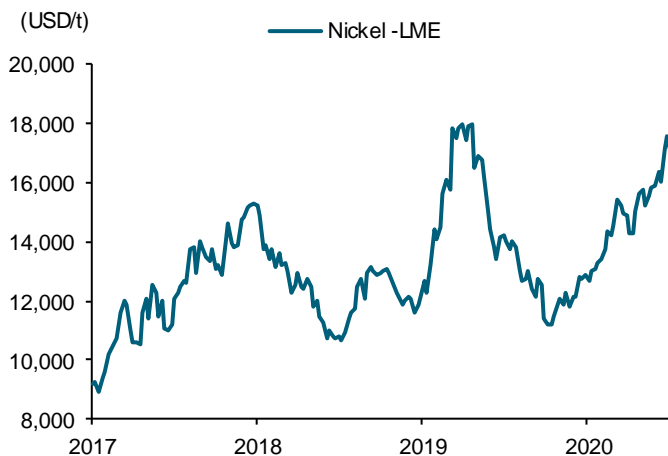
Exhibit 18: Steel sheet price



Source: Bloomberg

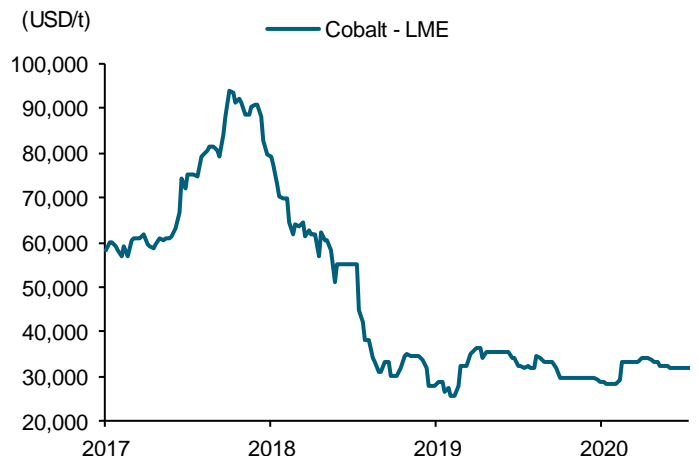
The second way to reduce battery costs is to change the metallic material used to coat the cathode from NMC to other materials. In most types of batteries used today, besides lithium which is a base material for any Li-ion battery, nickel is the most common material used to produce the battery coating, followed by cobalt and manganese.

Exhibit 19: Nickel price



Source: Bloomberg

Exhibit 20: Cobalt price



Source: Bloomberg

However, due to the much higher cost of cobalt than other materials, which is currently at USD32,000/tonne for cobalt, 2x higher than the price of nickel at USD16,000/tonne and 16x higher than the price of manganese at USD2,000/tonne as of January 2021, the cobalt cost is the largest material cost to produce Li-ion batteries. Hence, we think NMC-based batteries with an NMC ratio of 8:1:1 will remain the formula for NMC batteries over the next several years before any technological breakthrough in battery production, material science, and technology could challenge EA's existing NMC battery.

Semi-solid state battery technology – GPSC’s core battery. On 25 December 2020, GPSC announced that the company will start the construction of its energy storage unit production plant in Thailand using semi-solid technology. The battery plant, located in the Map Ta Phut Industrial Estate in Rayong province, has an investment cost of THB1.1b with an initial capacity of 30MWh.

According to GPSC’s management, this plant is the first step in its growth strategy to create a new business for S-curve growth. GPSC’s semi-solid battery cells in Thailand will be called “G-Cell” and the battery production plant is expected to commence its COD in 2Q21. The target market will be for mobility and stationary purposes and will be supplied to industrial plants, charging stations and transportation businesses such as EV Tuk-Tuks and E-buses.

Exhibit 21: GPSC’s semi-solid state battery



Source: GPSC

Exhibit 22: Semi-solid battery

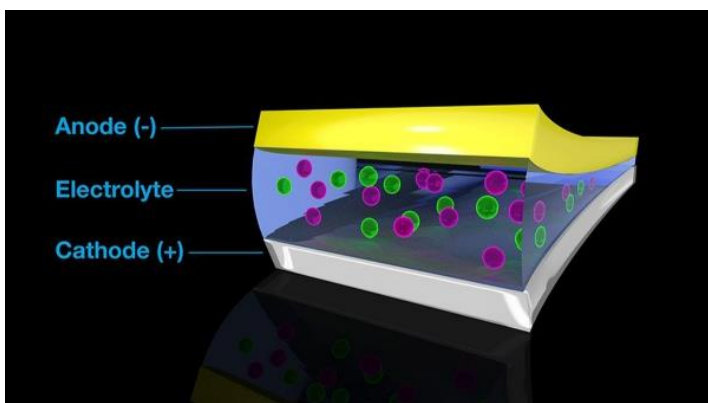


Source: GPSC

According to GPSC’s management, the company expects that its innovative LIB battery “G-Cell” using the semi-solid state (gel) or solid state (glass) as a key electrolyte, rather than the conventional liquid-based electrolyte used in NMC and LFP-based batteries, could enhance the performance of its battery via 1) reducing the risk of short circuits or “dendrites” – the automatic melting of cathodes and anodes that result in a short circuit – by allowing the cathodes and anodes to be closer to each other and thereby increase the number of battery cells for greater energy density; and 2) lower material costs by changing from lithium to sodium.

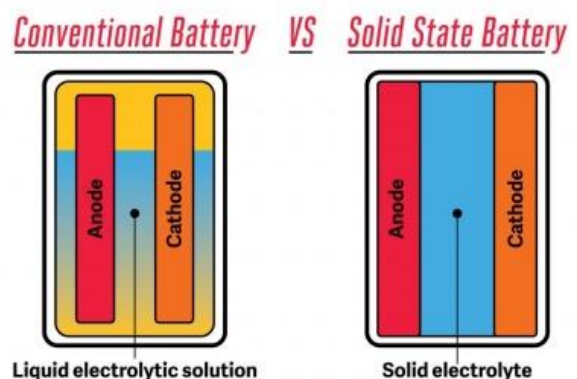
GPSC plans to start the operation of its 30MWh pilot semi-solid battery plant in 2Q21 and could later ramp it up to 100MWh if the functionality and reliability of its G-Cell can be achieved at a commercially safe level, which we think could take at least 2-3 years.

Exhibit 23: Simplified structure of Lithium-ion battery



Source: GPSC

Exhibit 24: Comparison of battery structure (liquid vs solid state)

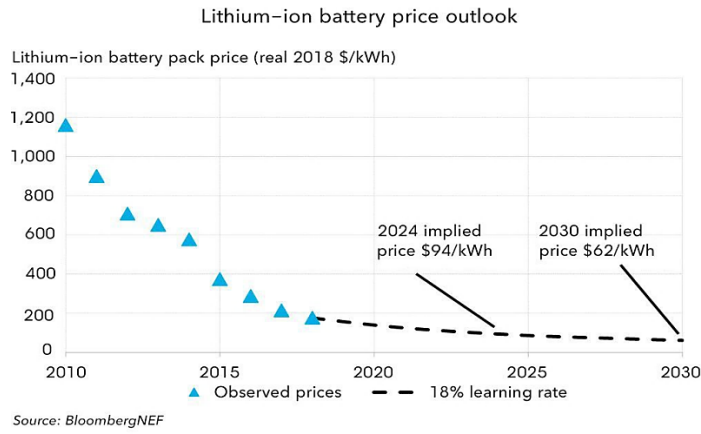


Source: GPSC

Battery cost is key

According to BloombergNEF (BNEF), a research organization focusing on clean energy, advanced transportation, digital industry, innovative materials and commodities, the demand for batteries is projected to rise sharply during 2020-25, mainly from EVs, with small chunk of demand from consumer and stationary storage segments.

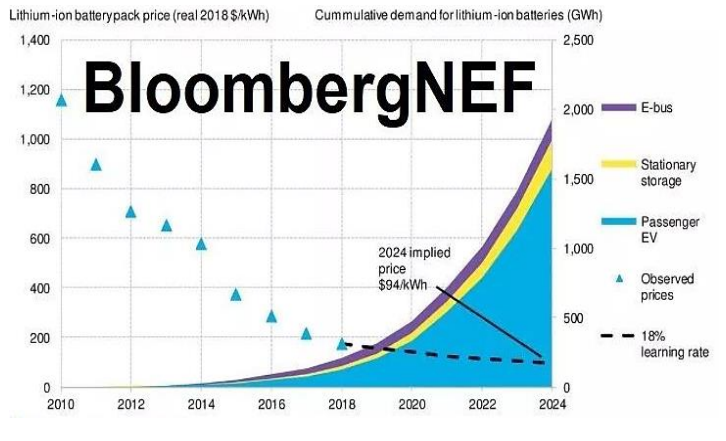
Exhibit 25: Projected battery cost for Li-ion batteries



Source: BloombergNEF

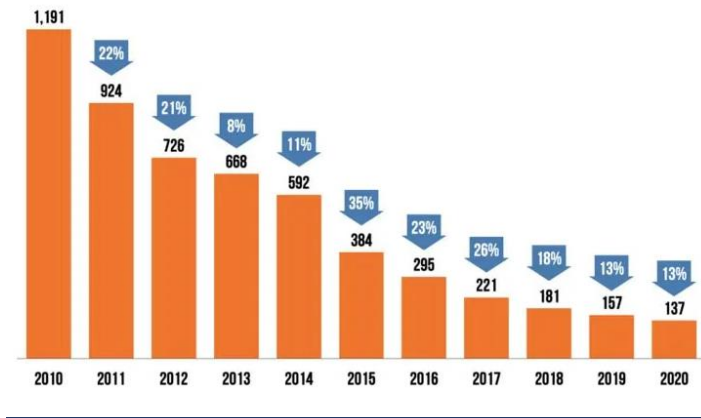
Thanks to the looming demand explosion, BNEF projects that the price of a battery pack will decline from USD137/kWh in 2020, a 13% y-y drop, down to only USD94/kWh in 2024 and USD62/kWh in 2030, based on an average 18% learning rate of cost reduction, which is in line with the historical annual average cost reduction of 19% CAGR in 2010-20.

Exhibit 26: Projected demand for batteries in consumer electronic products and EVs vs battery price projection



Source: BloombergNEF

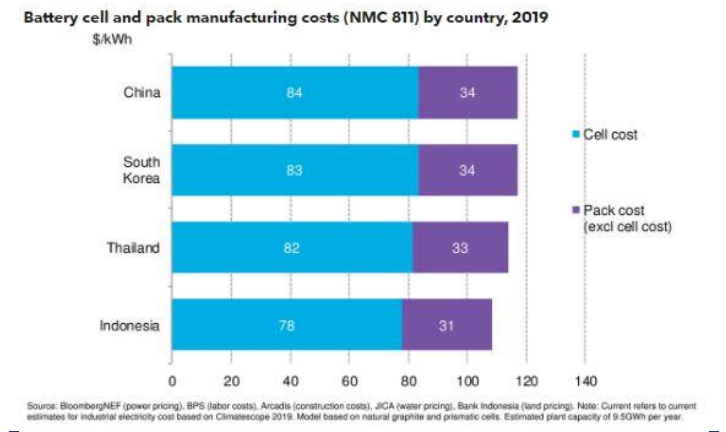
Exhibit 27: Price of an Li-ion battery pack, volume-weighted average – real 2020 USD per kWh



Source: BloombergNEF

BNEF also projects that the cost for batteries made in Thailand will be competitive with other major battery producers, thanks to certain companies' first-mover and proven technological advantages, the strong demand for batteries from the power and automotive industries, and the timely and effective incentive packages for investment, including packages related to the EEC, the BOI, and lower excise taxes for EVs.

Exhibit 28: Cost of battery cells and packs



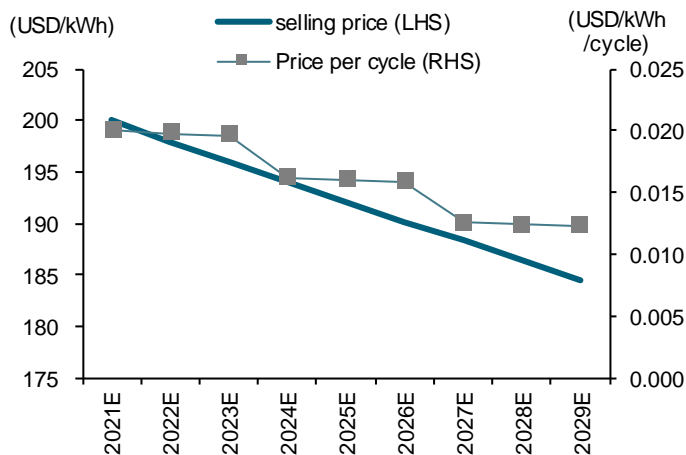
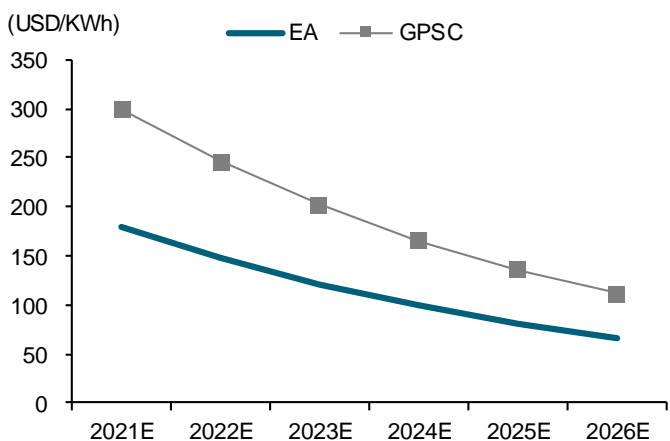
Source: BloombergNEF

Our projected battery prices for EA and GPSC. We believe EA's battery cost will be competitive at USD165/kWh when it starts to produce the NMC-based batteries from its 1GWh first phase battery plant in 2Q21. If we include the other costs like packaging, we estimate that EA's selling price for its batteries could start at USD200/kWh in 2021 and then gradually decline to 185/kWh in 2026, driven by lower production costs and the economies of scales.

For GPSC, we estimate that the production cost of its G-Cell semi-solid state battery will be USD300/kWh once it commences the COD of its 30MWh (3% of EA's 1GWh capacity) plant in 2Q21. We project that the production cost will drop to USD120/kWh in 2026 at a declining rate of 18% CAGR.

Exhibit 29: Battery cost comparison (EA vs GPSC)

Exhibit 30: EA's projected battery selling price



Source: FSSIA estimates


Source: FSSIA estimates

Current EV car industry in Thailand

We believe Thailand is now at an inflection point to see explosive demand growth in the EV industry, considering that 1) the number of new BEVs has jumped markedly in 9M20; 2) the EVs produced domestically will be competitive in not only production cost and price due to high tax incentive schemes and the large cluster of automotive part producers, but also in driving performance, thanks to EA's first-mover position and the existing competitive cluster within the ICE-based automotive industry that is now poised to transition to the EV manufacturing industry; and 3) the timely and favourable regulations and government promotions, which include the BOI, the EEC, and the excise tax scheme.









In Thailand, as of 2020, there are only two major producers of EVs – EA and FOMM. EA has invested in constructing an integrated value chain of battery products, which include production plants for batteries (1GWh for the first phase, COD in 2Q21, expandable up to 50GWh), EV cars, E-buses, and the recent launch of operational E-ferrys on the Chaophraya River. The second EV producer is FOMM (First One Mile Mobility), a Japanese BEV producer of compact EV cars sold at THB0.6m per car vs THB1.1m per EV car for EA. Due to its small size, FOMM has sold only 0.4m units in Thailand to date.








Exhibit 31: EV car models in Thailand as of July 2020



สรุปรถยนต์ไฟฟ้า BEV ที่มีจำหน่ายในประเทศไทยปี 2020

Summary of Battery Electric Vehicle Models in Thailand

	 Audi	 BMW	 BYD	 BYD	 FOMM	 HYUNDAI
	e-tron 55 quattro	BMW i3s	e6	M3, T3	ONE	KONA Electric
ประเภทตัวถัง Socket Type	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 2	AC Type 2	AC Type 2	AC Type 2 & CCS2
ระยะทางวิ่งสูงสุด EV Range (km)	417	280	400	300	160	312 (SE) 482 (SEL)
ขนาดแบตเตอรี่ Battery Size (KWh)	95	33	80	50.3	11.8	39.2 (SE) 64 (SEL)
ประเทศที่ผลิต Country of Origin						
ภาษ่นำเข้า Import Tax	80%	80%	0%	0%	-	40%
ภาษีสรรพสามิต Excise Tax	8%	8%	8%	8%	0%	8%
ราคาขาย Retail Price (Baht)	5,099,000	3,730,000	1,400,000	1,089,000 [M3] 1,059,000 [T3] ๑ Seat 999,000 [T3] 2 Seat	664,000	1,849,000 (SE) 2,259,000 (SEL)
ข้อมูลเพิ่มเติม More Info						

	 HYUNDAI	 JAGUAR	 KIA	 MG	 MINI	 NISSAN	 TESLA
	IONIQ Electric	I-PACE	All-New Soul EV	ZS EV	MINI Cooper SE	LEAF	TTE 500
ประเภทตัวถัง Socket Type	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 1 & CCS1	AC Type 2 & CCS2	AC Type 2 & CCS2	AC Type 1 & CHRDemo	AC Type 2
ระยะทางวิ่งสูงสุด EV Range (km)	280	470	452	337	217	311	100
ขนาดแบตเตอรี่ Battery Size (KWh)	28	90	64	44.5	32.6	40	11
ประเทศที่ผลิต Country of Origin							
ภาษ่นำเข้า Import Tax	40%	80%	40%	0%	80%	20%	-
ภาษีสรรพสามิต Excise Tax	8%	8%	8%	8%	8%	8%	0%
ราคาขาย Retail Price (Baht)	1,749,000	5,499,000 (S) 6,299,000 (SE) 6,999,000 (HSE)	2,387,000	1,190,000	2,290,000	1,490,000	438,000
ข้อมูลเพิ่มเติม More Info							

ข้อมูล ณ วันที่ 16 ก.ค. 2563 สมาคมรถยนต์ไฟฟ้าไทย
Updated on 16 July 2020 by Electric Vehicle Association of Thailand

Source: EVAT

EA is Thailand's clear leader in EV

EA is a first mover into the EV value chain in Thailand. It is Thailand's only integrated company in the E-value chain business, with an upstream battery plant, mid-stream EV manufacturing plants for EV cars, E-buses and E-ferries, and a downstream EV charging station business.

Exhibit 32: Skywell EV bus offered free services during 11-26 May 2020



Source: BangkokBusClub

Exhibit 33: EA's SPA1 model



Source: EA

While EA's SPA1 model is one of the most competitive EV cars among the major brands, we think EA's entry into E-buses will allow the company to timely capture the strong E-bus demand growth, and simultaneously lower the demand risk for its battery plant.

We think EA's THB1.2b manufacturing plant for EV cars and E-buses (COD in 4Q20), its position as a first mover in the EV market, the government's favourable investment tax privileges (EEC and BOI) and low excise tax scheme will allow EA to compete with other EV operators, both locally (Thailand-based, Japanese FOMM EV producer) and overseas.

EA and GPSC are the two key winners for EV and batteries

We think EA and GPSC – Thailand’s two leading players in the battery and EV businesses – will continue to see their share prices outperform in 2021, thanks to their strong net profit growth momentum that we project in 2021-22.

We believe EA’s share price is likely to follow the strong share price outperformance of global EV plays, including Tesla (TESLA US), NIO (NIO US), and Workhorse (WKHS US), which have all seen their share prices rise significantly in 2020. The share price of Nikola (NKLA US) had initially risen sharply but later plunged due to a management fraud issue.

In particular, two key EV car producers, TESLA and NIO, and one EV truck producer, WKHS, have seen their share prices rise YTD, reflecting investors’ confidence in and preference for EV car, bus and truck producers.

We believe that EA, as one of the key producers of EV cars, trucks, and buses, is likely to see its share price rerate in the next 12 months, driven by net profit growth from its sales and deliveries of EV cars, E-buses, and E-ferries. YTD, EA’s share price has risen 50%, catching up with the 200-400% share price rerating for those three key EV producers in 2020.

We think that with the launch of its E-ferries in Aug-20 and the delivery of its EV cars and E-buses in 2Q21E onward, investor confidence should rise further, driving its share price up again to price in its future strong net profit growth outlook from its EV ventures.

Exhibit 34: Peer comparisons

Company	BBG code	Rec	Share Price (LCY)	Target price (LCY)	Upside (%)	Market Cap (USD m)	3Y EPS CAGR (%)	PE		ROE		PBV		EV / EBITDA	
								20E (x)	21E (x)	20E (%)	21E (%)	20E (x)	21E (x)	20E (x)	21E (x)
THAILAND															
Energy Absolute*	EA TB	BUY	64.75	76.00	17	5,526	17.2	50.4	29.4	19.0	26.6	8.9	7.0	30.6	22.9
Thailand avg						5,526	17.2	50.4	29.4	19.0	26.6	8.9	7.0	30.6	22.9
US															
Tesla Inc	TSLA US	NA	880.02	NA	NA	834,172	NA	389.4	225.5	13.3	19.2	50.2	40.4	137.0	100.0
Nio Inc - Adr	NIO US	NA	58.92	NA	NA	92,672	NA	NA	NA	(33.1)	(95.4)	60.9	92.8	NA	NA
Nikola Corp	NKLA US	NA	17.75	NA	NA	6,818	NA	NA	NA	(49.8)	(42.8)	6.1	7.5	NA	NA
Workhorse	WKHS US	NA	25.57	NA	NA	3,081	NA	NA	NA	(69.2)	(8.2)	7.7	5.6	NA	NA
US avg						936,742	NA	346.8	200.8	7.9	7.3	50.8	45.3	122.0	89.0
Alternative energy under coverage						5,526	17.2	50.4	29.4	19.0	26.6	8.9	7.0	30.6	22.9
Average (all)						942,268	NA	345.0	199.8	8.0	7.4	50.5	45.0	121.5	88.6

Share prices as of 8 January 2021

Sources: Bloomberg, *FSSIA estimates

For GPSC, after its share price rise by over 30% from its bottom at THB51 in the beginning of Nov-20, we think there is still an upside for its net profit and share price, from the potential pricing in of the upsides from its gross margin expansion on lower gas costs, its potential shipping license to import LNG, the announcement of its 600MW gas-to-power plant in Myanmar, and the upcoming COD of its 30MWh pilot battery production plant in 2Q21.

Exhibit 35: Peer comparisons

Company	BBG code	Rec	Share Price (LCY)	Target price (LCY)	Upside (%)	Market Cap (USD m)	3Y EPS CAGR (%)	PE		ROE		PBV		EV / EBITDA	
								20E (x)	21E (x)	20E (%)	21E (%)	20E (x)	21E (x)	20E (x)	21E (x)
THAILAND															
Bcpq	BCPG TB	BUY	15.5	17.40	12	1,344	(2.6)	20.9	18.4	10.1	9.9	1.8	1.7	25.8	23.8
Ck Power	CKP TB	BUY	4.72	6.60	40	1,266	60.1	36.1	16.9	4.4	9.0	1.6	1.5	13.7	9.6
Energy Absolute	EA TB	BUY	64.75	76.00	17	7,818	17.2	50.4	29.4	19.0	26.6	8.9	7.0	30.6	22.9
Gunkul Engineering	GUNKUL TB	BUY	2.68	2.90	8	772	(9.7)	3.7	10.0	47.5	14.3	1.5	1.4	9.7	8.9
Demco Pcl	DEMCO TB	HOLD	3.3	2.70	(18)	80	79.5	17.9	14.9	4.2	4.9	0.7	0.7	(66.7)	(70.4)
Power Solution	PSTC TB	BUY	1.77	1.09	(38)	139	(100.0)	34.0	22.3	10.0	14.1	3.3	3.0	24.2	16.4
Sermasang Power	SSP TB	BUY	12.8	16.00	25	396	27.8	14.0	11.2	20.3	21.5	2.6	2.2	11.2	8.6
Tpc Power	TPCH TB	BUY	12.4	15.00	21	166	19.8	8.9	8.3	18.6	17.5	1.6	1.3	6.2	5.9
Tpi Polene Power	TPIPP TB	BUY	4.4	5.70	30	1,235	(0.5)	7.8	7.8	17.1	16.2	1.3	1.2	6.6	6.5
Absolute Clean Energy	ACE TB	BUY	3.84	4.80	25	1,320	45.1	18.3	16.2	9.2	9.3	1.6	1.5	13.0	10.6
Earth Tech Environment	ETC TB	HOLD	1.88	2.10	12	141	62.0	17.5	13.2	14.6	12.6	1.7	1.6	10.7	8.5
Thailand avg						14,677	18.7	35.4	22.3	17.2	19.9	5.5	4.4	22.4	17.3
HONGKONG															
Datang Intl Power	991 HK	NA	1.03	NA	NA	5,418	(8.7)	6.6	5.9	3.9	5.2	0.3	0.3	8.1	8.0
Huadian Power	1071 HK	NA	1.99	NA	NA	4,571	11.5	4.5	4.0	6.6	7.2	0.3	0.3	8.0	7.7
Huaneng Power	902 HK	NA	2.92	NA	NA	9,215	26.8	5.0	4.7	7.6	7.9	0.4	0.4	7.9	7.4
China Power Inter	2380 HK	NA	1.67	NA	NA	2,099		7.1	5.5	5.7	7.6	0.4	0.4	9.3	8.3
China Resources	836 HK	NA	8.36	NA	NA	5,223		4.7	4.1	11.4	12.2	0.5	0.5	5.7	5.0
Clp Holdings Ltd	2 HK	NA	72.7	NA	NA	23,540		16.0	15.4	10.5	10.7	1.6	1.6	10.3	9.9
Power Assets	6 HK	NA	41.55	NA	NA	11,395		14.2	13.7	7.1	7.6	1.0	1.0	61.4	71.4
Hongkong avg						61,462	4.1	11.1	10.5	8.5	9.0	1.0	1.0	18.6	20.1
MALAYSIA															
Petronas Gas	PTG MK	NA	16.9	NA	NA	8,202	2.1	16.4	16.4	15.2	15.2	2.6	2.5	9.1	9.0
Tenaga Nasional	TNB MK	NA	10.52	NA	NA	14,589	4.5	13.6	11.9	7.4	8.2	1.0	1.0	7.3	7.0
Ytl Power Inte	YTLP MK	NA	0.675	NA	NA	1,344	(0.5)	17.6	15.6	2.7	2.7	0.5	0.5	10.6	10.5
Malaysia avg						24,134	3.4	14.8	13.6	9.8	10.3	1.5	1.5	8.1	7.8
CHINA															
China Datang	1798 HK	NA	1.65	NA	NA	1,623		9.9	8.7	7.8	6.8	0.7	0.7	9.1	8.2
China Gas	384 HK	NA	30.85	NA	NA	21,040		17.5	15.1	23.2	24.0	3.8	3.4	14.6	12.1
China Longyuan	916 HK	NA	11.58	NA	NA	11,690		15.7	13.9	9.0	9.4	1.4	1.3	9.0	8.1
Beijing Enterprises	392 HK	NA	25.1	NA	NA	4,093		4.2	3.9	9.7	9.7	0.4	0.4	10.0	9.9
Kunlun Energy	135 HK	NA	7.66	NA	NA	8,420		9.6	9.2	11.1	11.7	1.0	1.0	4.9	4.3
China avg						46,866	-	14.2	12.5	15.8	16.3	2.3	2.1	10.9	9.4
Utilities under coverage						14,677	19	35	22	17	20	5	4	22	17
Average (all)						147,139	4.1	15.1	12.8	11.9	12.6	1.9	1.7	14.8	14.4

Share prices as of 8 January 2021

Sources: Bloomberg, FSSIA estimates

Corporate Governance report of Thai listed companies 2019

EXCELLENT LEVEL										
AAV	ADVANC	AIRA	AKP	AKR	AMA	AMATA	AMATAV	ANAN	AOT	AP
ARROW	BAFS	BANPU	BAY	BCP	BCPG	BOL	BRR	BTS	BTW	BWG
CFRESH	CHEWA	CHO	CK	CKP	CM	CNT	COL	COMAN	CPALL	CPF
CPI	CPN	CSS	DELTA	DEMCO	DRT	DTAC	DTC	EA	EASTW	ECF
EGCO	GBX	GC	GCAP	GEL	GFPT	GGC	GOLD	GPSC	GRAMMY	GUNKUL
HANA	HARN	HMPRO	ICC	ICHI	III	ILINK	INTUCH	IRPC	IVL	JKN
JSP	K	KBANK	KCE	KKP	KSL	KTB	KTC	KTIS	LH	LHFG
LIT	LPN	MAKRO	MALEE	MBK	MBKET	MC	MCOT	MFEC	MINT	MONO*
MTC	NCH	NCL	NKI	NSI	NVD	NYT	OISHI	OTO	PAP	PCSGH
PDJ	PG	PHOL	PJW	PLANB	PLANET	PORT	PPS	PR9	PREB	PRG
PRM	PSH	PSL	PTG	PTT	PTTEP	PTTGC	PYLON	Q-CON	QH	QTC
RATCH	ROBINS**	RS	S	S & J	SABINA	SAMART	SAMTEL	SAT	SC	SCB
SCC	SCCC	SCN	SDC	SEAFCO	SEAOIL	SE-ED	SELIC	SENA	SIS	SITHAI
SNC	SORKON	SPALI	SPI	SPRC	SSSC	STA	STEC	SVI	SYNTEC	TASCO
TCAP	THAI	THANA	THANI	THCOM	THIP	THREL	TIP	TISCO	TK	TKT
TMB	TMILL	TNDT	TOA	TOP	TRC	TRU	TRUE	TSC	TSR	TSTH
TTA	TTCL	TTW	TU	TVD	TVO	U	UAC	UV	VGI	VIH
WACOAL	WAVE	WHA	WHAUP	WICE	WINNER					
VERY GOOD LEVEL										
2S	ABM	ADB	AF	AGE	AH	AHC	AIT	ALLA	ALT	AMANA
AMARIN	APCO	APCS	AQUA	ARIP	ASAP	ASIA	ASIAN	ASIMAR	ASK	ASN
ASP	ATP30	AUCT	AYUD	B	BA	BBL	BDMS	BEC	BEM	BFIT
BGC	BGRIM	BIZ	BJC	BJCHI	BLA	BPP	BROOK	CBG	CEN	CENTEL
CGH	CHG	CHOTI	CHOW	CI	CIMBT	CNS	COLOR	COM7	COTTO	CRD
CSC	CSP	DCC	DCON	DDD	DOD	EASON	ECL	EE	EPG	ERW
ESTAR	ETE	FLOYD	FN	FNS	FORTH	FPI	FPT	FSMART	FSS	FVC
GENCO	GJS	GL	GLOBAL	GLOW**	GULF	HPT	HTC	HYDRO	ICN	IFS
INET	INSURE	IRC	IRCP	IT	ITD***	ITEL	J	JAS*	JCK	JCKH
JMART	JMT	JWD	KBS	KCAR	KBS	KIAT	KOOL	KWC	KWM	L&E
LALIN	LANNA	LDC	LHK	LOXLEY	LRH	LST	M	MACO	MAJOR	MBAX
MEGA	METCO	MFC	MK	MODERN	MOONG	MPG	MSC	MTI	NEP	NETBAY
NEX	NINE	NOBLE	NOK	NTV	NWR	OCC	OGC	ORI	OSP	PATO
PB	PDG	PDI	PL	PLAT	PNR	PPP	PRECHA	PRIN	PRINC	PSTC
PT	QLT	RCL	RICHY	RML	RWI	S11	SAAM	SALEE	SAMCO	SANKO
SAPPE	SAWAD	SCG	SCI	SCP	SE	SFP	SIAM	SINGER	SIRI	SKE
SKR	SKY	SMIT	SMK	SMPC	SMT	SNP	SONIC	SPA	SPC	SPCG
SPVI	SR	SRICHA	SSC	SSF	SST	STANLY	STPI	SUC	SUN	SUSCO
SUTHA	SWC	SYMC	SYNEX	T	TACC	TAE	TAKUNI	TBSP	TCC	TCMC
TEAM	TEAMG	TFG	TFMAMA	THG	THRE	TIPCO	TITLE	TIW	TKN	TKS
TM	TMC	TMD	TMI	TMT	TNITY	TNL	TNP	TNR	TOG	TPA
TPAC	TPBI	TPCORP	TPOLY	TRITN	TRT	TSE	TSTE	TVI	TVT	TWP
TWPC	UBIS	UEC	UMI	UOBKH	UP	UPF	UPOIC	UT	UWC	VNT
WIIK	XO	YUASA	ZEN	ZMICO						
GOOD LEVEL										
A	ABICO	ACAP***	AEC	AEONTS	AJ	ALUCON	AMC	APURE	AS	ASEFA
AU	B52	BCH	BEAUTY	BGT	BH	BIG	BLAND	BM	BR	BROCK
BSBM	BSM	BTNC	CCET	CCP	CGD	CHARAN	CHAYO	CITY	CMAN	CMC
CMO	CMR	CPL	CPT	CSR	CTW	CWT	D	DIMET	EKH	EMC
EPCO	ESSO	FE	FTE	GIFT	GLAND	GLOCON	GPI	GREEN	GTB	GYT
HTECH	HUMAN	IHL	INGRS	INOX	JTS	JUBILE	KASET	KCM	KKC	KWG
KYE	LEE	LPH	MATCH	MATI	M-CHAI	MCS	MDX	META	MGT	MJD
MM	MVP	NC	NDR	NER	NNCL	NPK	NUSA	OCEAN	PAF	PF
PICO	PIMO	PK	PLE	PMTA	POST	PPM	PROUD	PTL	RCI	RJH
ROJNA	RPC	RPH	SF	SGF	SGP	SKN	SLP	SMART	SOLAR	SPG
SQ	SSP	STI	SUPER	SVOA	TCCC	THE	THMUI	TIC	TIGER	TNH
TOPP	TPCH	TIPIP	TPLAS	TQM	TTI	TYCN	UTP	VCOM	VIBHA	VPO
WIN	WORK	WP	WPH	ZIGA						
Score Range	Number of Logo					Description				
90-100						Excellent				
80-89						Very Good				
70-79						Good				
60-69						Satisfactory				
50-59						Pass				
Less than 50	No logo given					-				

Disclaimer:

The disclosure of the survey results of the Thai Institute of Directors Association ("IOD") regarding corporate governance is made pursuant to the policy of the Office of the Securities and Exchange Commission. The survey of the IOD is based on the information of a company listed on the Stock Exchange of Thailand and the Market for Alternative Investment disclosed to the public and able to be accessed by a general public investor. The result, therefore, is from the perspective of a third party. It is not an evaluation of operation and is not based on inside information.

The survey result is as of the date appearing in the Corporate Governance Report of Thai Listed Companies. As a result, the survey results may be changed after that date. FSS International Investment Advisory Company Limited does not confirm nor certify the accuracy of such survey results.

* CGR scoring should be considered with news regarding wrong doing of the company or director or executive of the company such unfair practice on securities trading, fraud, and corruption SEC imposed a civil sanction against insider trading of director and executive; ** delisted

Source: Thai Institute of Directors Association (IOD); FSSIA's compilation

Anti-corruption Progress Indicator

CERTIFIED										
ADVANC	AIE	AKP	AMANAHA	AP	APCS	AQUA	ARROW	ASK	ASP	AYUD
BAFS	BANPU	BAY	BBL	BCH	BCP	BCPG	BGRIM	BJCHI	BKI	BLA
BROOK	BRR	BSBM	BTS	BWG	CEN	CENTEL	CFRESH	CGH	CHEWA	CIG
CIMBT	CM	COM7	CPALL	CPF	CPI	CPN	CSC	DCC	DEMCO	DIMET
DRT	DTAC	DTC	EASTW	ECL	EGCO	FE	FNS	FSS	GBX	GC
GCAP	GEL	GFPT	GGC	GJS	GOLD	GPSC	GSTEEL	GUNKUL	HANA	HARN
HMPRO	HTC	ICC	IFS	INET	INSURE	INTUCH	IRPC	IVL	K	KASET
KBANK	KBS	KCAR	KCE	KGI	KKP	KSL	KTB	KTC	KWC	L&E
LANNA	LHK	LPN	LRH	M	MAKRO	MALEE	MBAX	MBK	MBKET	MC
MCOT	MFC	MINT	MONO	MOONG	MSC	MTI	NBC	NINE	NKI	NMG
NNCL	NSI	OCC	OCEAN	OGC	PAP	PATO	PB	PCSGH	PDG	PDI
PDJ	PE	PG	PHOL	PL	PLANB	PLANET	PLAT	PM	PPP	PPS
PREB	PRG	PRINC	PSH	PSTC	PT	PTG	PTT	PTTEP	PTTGC	PYLON
Q-CON	QH	QLT	QTC	RATCH	RML	S & J	SABINA	SAT	SC	SCB
SCC	SCCC	SCG	SCN	SE-ED	SELIC	SENA	SGP	SIRI	SIS	SITHAI
SMIT	SMK	SMPC	SNC	SNP	SORKON	SPACK	SPC	SPI	SPRC	SRICHA
SSF	SSI	SSSC	SST	STA	SUSCO	SVI	SYNTEC	TASCO	TCAP	TFG
TFI	TFMAMA	THANI	THCOM	THIP	THRE	THREL	TIP	TIPCO	TISCO	TKT
TMB	TMD	TMILL	TMT	TNITY	TNL	TNP	TNR	TOG	TOP	TPA
TPCORP	TRU	TRUE	TSC	TSTH	TTCL	TU	TVD	TVI	TWPC	U
UBIS	UEC	UKEM	UOBKH	VGI	VIH	VNT	WACOAL	WHA	WICE	WIIK
DECLARED										
2S	ABICO	AF	AI	AIRA	ALT	AMA	AMARIN	AMATA	ANAN	B
BM	BPP	BUI	CHG	CHO	CHOTI	CHOW	CI	CMC	COL	DDD
DELTA	EFORL	EPCO	ESTAR	ETE	FPI	FTE	ICHI	INOX	IRC	ITEL
JAS	JSP	JTS	KWG	LDC	LIT	META	MFEC	MPG	NEP	NOK
NWR	ORI	PRM	PSL	ROJNA	RWI	SAAM	SAPPE	SCI	SEOIL	SHANG
SKR	SPALI	STANLY	SYNEX	TAE	TAKUNI	TMC	TOPP	TPP	TRITN	TVO
UV	UWC	WHAUP	XO	YUASA	ZEN					

Level	
Certified	This level indicates practical participation with thoroughly examination in relation to the recommended procedures from the audit committee or the SEC's certified auditor, being a certified member of Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC) or already passed examination to ensure independence from external parties.
Declared	This level indicates determination to participate in the Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC)

Disclaimer:

The disclosure of the Anti-Corruption Progress Indicators of a listed company on the Stock Exchange of Thailand, which is assessed by Thaipat Institute, is made in order to comply with the policy and sustainable development plan for the listed companies of the Office of the Securities and Exchange Commission. Thaipat Institute made this assessment based on the information received from the listed company, as stipulated in the form for the assessment of Anti-corruption which refers to the Annual Registration Statement (Form 56-1), Annual Report (Form 56-2), or other relevant documents or reports of such listed company. The assessment result is therefore made from the perspective of Thaipat Institute that is a third party. It is not an assessment of operation and is not based on any inside information. Since this assessment is only the assessment result as of the date appearing in the assessment result, it may be changed after that date or when there is any change to the relevant information. Nevertheless, FSS International Investment Advisory Company Limited does not confirm, verify, or certify the accuracy and completeness of the assessment results.

Note: Companies participating in Thailand's Private Sector Collective Action Coalition Against Corruption programme (Thai CAC) under Thai Institute of Directors (as of June 24, 2019) are categorised into: 1) companies that have declared their intention to join CAC, and; 2) companies certified by CAC.

Source: The Securities and Exchange Commission, Thailand; * FSSIA's compilation

GENERAL DISCLAIMER

ANALYST(S) CERTIFICATION

Suwat Sinsadok FSS International Investment Advisory Securities Co., Ltd

The individual(s) identified above certify(ies) that (i) all views expressed in this report accurately reflect the personal view of the analyst(s) with regard to any and all of the subject securities, companies or issuers mentioned in this report; and (ii) no part of the compensation of the analyst(s) was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed herein.

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Company	Ticker	Price	Rating	Valuation & Risks
BCPG	BCPG TB	THB 15.50	BUY	The downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand, the Philippines and Indonesia; and 2) government intervention by way of electricity tariff subsidies.
CK Power	CKP TB	THB 4.72	BUY	The downside risks to our SoTP-based TP include lower-than-expected demand for electricity in Thailand and lower-than-expected water supply for hydro projects.
Energy Absolute	EA TB	THB 64.75	BUY	Downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand; 2) lower crude prices; and 3) lower-than-expected demand for batteries.
Gunkul Engineering	GUNKUL TB	THB 2.68	BUY	The downside risks to our SoTP-based TP on GUNKUL include 1) lower-than-expected demand for electricity in Thailand; 2) declining EPC backlogs; and 3) lower-than-expected utilisation rates for solar and wind farms.
Demco	DEMCO TB	THB 3.3	HOLD	The upside risks to our SoTP-based TP on DEMCO include 1) higher-than-expected demand for electricity in Thailand; and 2) higher EPC demand. Downside risk includes delays in bidding for power transmission projects.
Power Solution Technologies	PSTC TB	THB 1.77	BUY	The downside risks to our SoTP-based TP on PSTC include 1) lower-than-expected demand for electricity in Thailand and delays of power plant project start-ups.
Sermasang Power Corp	SSP TB	THB 12.80	BUY	The downside risks to our SoTP-based TP for SSP include 1) a lower-than-expected demand for electricity in Thailand; 2) a lower crude price; and 3) project start-up delays.
TPC Power Holding	TPCH TB	THB 12.40	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand; 2) a lower crude price; and 3) higher costs of biomass feedstock.
TPI Polene Power	TPIPP TB	THB 4.40	BUY	Downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand; 2) lower crude prices; and 3) unplanned shutdowns of the company's power plants.
Absolute Clean Energy	ACE TB	THB 3.84	BUY	The downside risks to our SoTP-based TP include 1) lower-than-expected demand for electricity in Thailand; 2) a lower crude price; and 3) higher costs of biomass feedstock.
Earth Tech Environment	ETC TB	THB 1.88	HOLD	Downside risks to our SoTP-based TP include: 1) lower-than-expected demand for electricity in Thailand; 2) lower crude prices; and 3) lower-than-expected industrial waste volumes. The upside risk would be the faster and larger-than-expected new capacity won by ETC in 2021.
PTT	PTT TB	THB 42.50	BUY	Risks to our SoTP-based valuation are the oil price and potential earnings downsides from government intervention.

Source: FSSIA estimates

Additional Disclosures

Target price history, stock price charts, valuation and risk details, and equity rating histories applicable to each company rated in this report is available in our most recently published reports. You can contact the analyst named on the front of this note or your representative at Finasia Syrus Securities Public Company Limited

FSSIA may incorporate the recommendations and target prices of companies currently covered by FSS Research into equity research reports, denoted by an 'FSS' before the recommendation. FSS Research is part of Finasia Syrus Securities Public Company Limited, which is the parent company of FSSIA.

All share prices are as at market close on 08-Jan-2021 unless otherwise stated.

RECOMMENDATION STRUCTURE

Stock ratings

Stock ratings are based on absolute upside or downside, which we define as $(\text{target price}^* - \text{current price}) / \text{current price}$.

BUY (B). The upside is 10% or more.

HOLD (H). The upside or downside is less than 10%.

REDUCE (R). The downside is 10% or more.

Unless otherwise specified, these recommendations are set with a 12-month horizon. Thus, it is possible that future price volatility may cause a temporary mismatch between upside/downside for a stock based on market price and the formal recommendation.

* In most cases, the target price will equal the analyst's assessment of the current fair value of the stock. However, if the analyst doesn't think the market will reassess the stock over the specified time horizon due to a lack of events or catalysts, then the target price may differ from fair value. In most cases, therefore, our recommendation is an assessment of the mismatch between current market price and our assessment of current fair value.

Industry Recommendations

Overweight. The analyst expects the fundamental conditions of the sector to be positive over the next 12 months.

Neutral. The analyst expects the fundamental conditions of the sector to be maintained over the next 12 months.

Underweight. The analyst expects the fundamental conditions of the sector to be negative over the next 12 months.

Country (Strategy) Recommendations

Overweight (O). Over the next 12 months, the analyst expects the market to score positively on two or more of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Neutral (N). Over the next 12 months, the analyst expects the market to score positively on one of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Underweight (U). Over the next 12 months, the analyst does not expect the market to score positively on any of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.