



SIRIM *Link*

THE PULSE OF MALAYSIA'S *EV Ecosystem*

6.941

3

Lithium

1500 mAh 3.7 V

Lithium - ion Battery

1500 mAh 3.7 V

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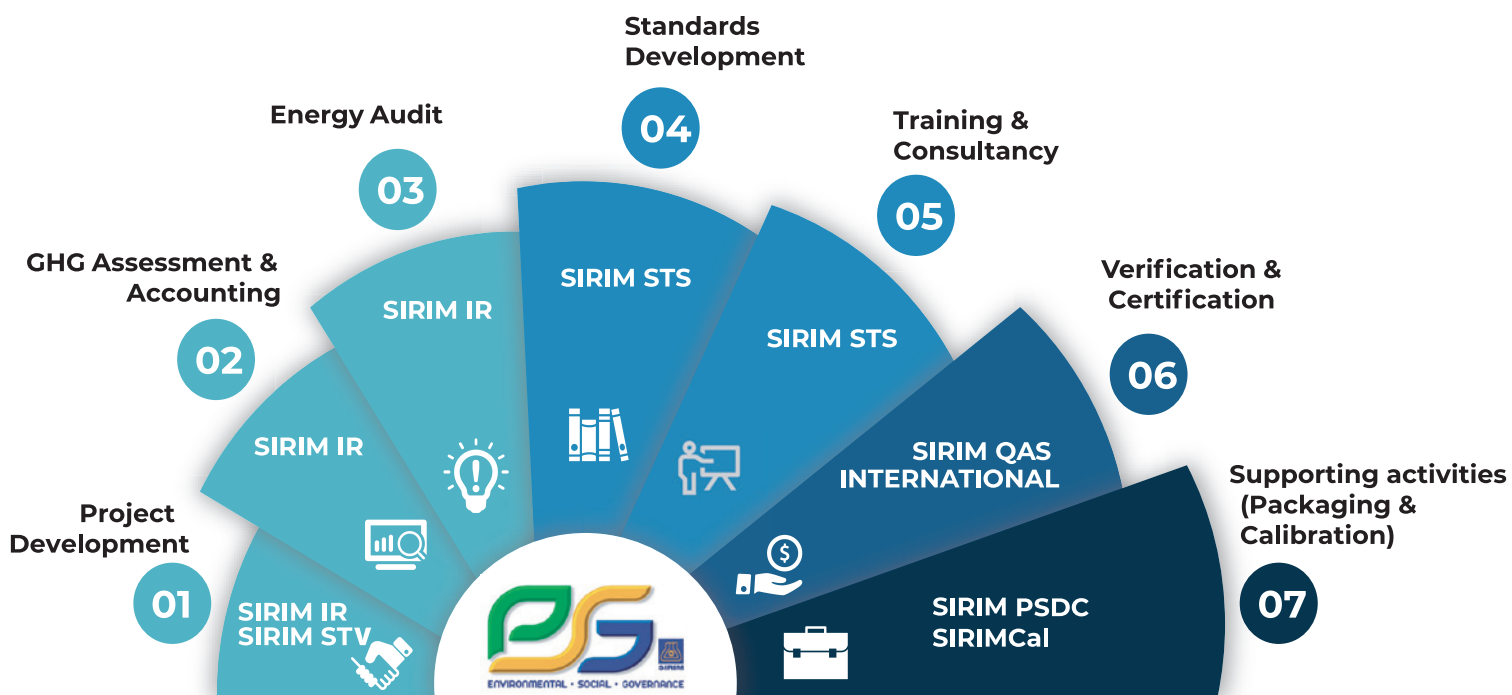
Dr. Md Azman Seeni Mohamed

Catalysing Innovation in
Electric Mobility



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Malaysia officially welcomed Tesla electric vehicles (EVs) this year, marking a significant stride towards a more sustainable transportation landscape. This is not only aligned with the nation's commitment to environmental stewardship but also anticipated to accelerate the momentum of an already burgeoning EV sector.



SPARKING AN *Electrifying Transformation*

As we march steadily towards net-zero emissions, the integration of EVs is of paramount importance in shaping the future of our transportation industry. Consequently, the government's ambitious net-zero goal and comprehensive roadmaps are set to pave the way for a seamless path forward.

Armed with extensive experience and expertise as a leading name in innovation under the auspices of Malaysia's Ministry of Investment, Trade and Industry (MITI), SIRIM is well-poised to support the nation's journey in this transformative endeavour, and we sincerely extend an invitation to all stakeholders to join in our efforts. In building a robust EV ecosystem, we recognise that collaboration and synergy are pivotal. In view of that, we look forward to welcoming you to take advantage of the foundation that we are laying and do your part in steering Malaysia towards a cleaner, greener and more sustainable tomorrow.

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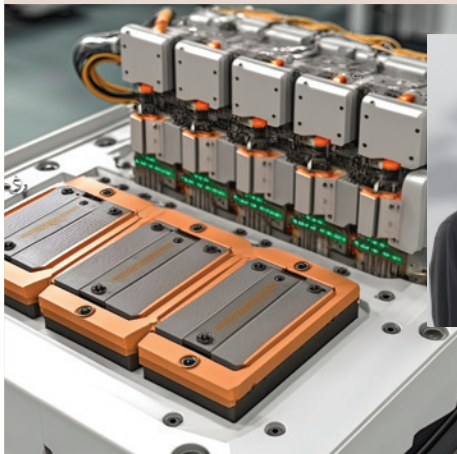
highlights



06

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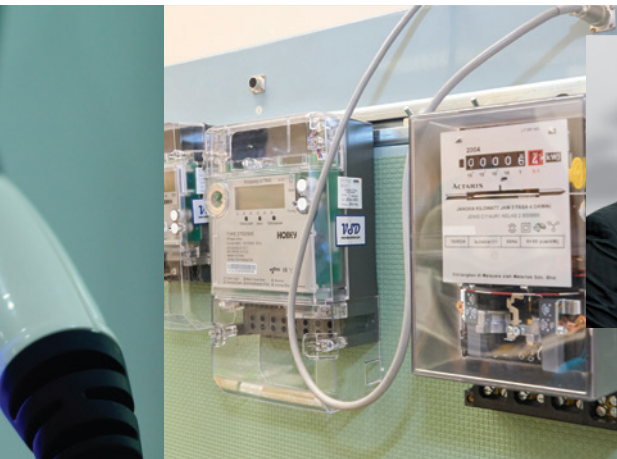
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IN THE EV ECOSYSTEM



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DR. ABDUL HAKIM HASHIM
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CHARGING UP FOR
THE FUTURE



FAIZAL MOHD YUSOF
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ACCELERATING AHEAD IN THE *EV Ecosystem*

Malaysia's electric vehicle (EV) scene is igniting change. Beyond the statistical projections, the EV industry is set to propel us into a future that reshapes industries. Yet, amidst the enthusiasm, navigating the EV terrain is no easy feat.

In recent years, there has been a significant development surge in the electric vehicle (EV) industry. Alongside this, the industry's 'growing pains' need to be addressed. It is amidst this dynamic landscape that the Ministry of Investment, Trade and Industry (MITI) is one of the key players taking the reins in steering the revolutionary transformation, etching its mark on industries across the nation.

Faizal Mohd Yusof, the Senior Director of MITI's Industrial Development Division, unravels the complexities of a fourfold increase in electric grid infrastructure (EGI) skills. "Malaysia's electric future is about more than statistics. It's a voyage marked by overcoming challenges, fostering innovation and ultimately determining the destiny of EVs," he shared.

As Malaysia charges ambitiously into a future marked by sustainability and prosperity, MITI emerges as the avant-garde orchestrator, aligning its strategic endeavours that propels the nation towards unprecedented heights. In this electrifying journey, MITI doesn't just lead; it synchronises with the broader goals of the government in its bid to set the stage for an automotive revolution.

STRATEGIC VISION FOR EVs

MITI stands as a stalwart at the forefront of the nation's ambitious transition from internal combustion engine (ICE) vehicles to EVs. This transformative journey is meticulously outlined in the New Industrial

◆
 ◆ Malaysia's electric future is about more than statistics. It's a voyage marked by overcoming challenges, fostering innovation and ultimately determining the destiny of EVs. ◆

Master Plan 2030 (NIMP2030), a visionary roadmap that not only charts the course for economic growth but also underscores MITI's collaborative efforts with key governmental bodies, demonstrating a holistic approach toward fostering a sustainable and thriving future.

At the core of this paradigm shift is MITI's strategic emphasis on promoting the development and production of complex, high value-added products, with a special focus on EVs. The NIMP2030 positions



PRACTICAL MEASURES TO FURTHER THE EV LANDSCAPE:

- >> Strategic Emphasis on EVs
- >> Global Environmental Goals
- >> Infrastructure Readiness
- >> Comprehensive Support & Policies



One of the key aspects of our strategy involves aligning with global environmental goals. By actively promoting the development and production of EVs, MITI contributes to reducing the nation's carbon footprint, positioning us as a hub for sustainable mobility solutions. This forward-thinking approach not only ensures a competitive edge in the global market but also reinforces Malaysia's commitment to being an environmentally responsible nation.

Malaysia as a responsible global player committed to addressing environmental concerns and aligning with international efforts to achieve net-zero carbon emissions. MITI's commitment to steering the automotive industry towards a more environmentally conscious future is evident in its multifaceted approach, spanning various crucial aspects.

"One of the key aspects of our strategy involves aligning with global environmental goals. By actively promoting the development and production of EVs, MITI contributes to reducing the nation's carbon footprint, positioning us as a hub for sustainable mobility solutions. This forward-thinking approach not only ensures a competitive edge in the global market but also reinforces Malaysia's commitment to being an environmentally responsible nation," said Faizal.

In tandem with this, MITI's collaboration with other governmental bodies through the National EV Taskforce (NEVTF) further amplifies its impact. By fostering a collaborative ecosystem, MITI ensures that the transition to EVs is seamlessly integrated into broader national strategies. For example, the NEVTF acknowledges the importance to develop the EV sector to support the future energy goals and protect the environment.



In adopting a comprehensive approach that extends beyond policy frameworks, we have been able to include practical measures that support the growth of the EV industry. Initiatives aimed at enhancing infrastructure readiness play a pivotal role in ensuring the smooth adoption of EVs. By formulating guidelines for charging infrastructure and creating an enabling environment for electric mobility, for example, we can actively contribute to overcoming one of the significant barriers to EV adoption.

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The collaboration frameworks established by MITI create a conducive environment for stakeholders across the EV value chain. "From manufacturers to service providers, the inclusive approach ensures that the entire ecosystem thrives. Moreover, MITI's tailored support and incentives for investors in the EV industry play a pivotal role in attracting capital and expertise. By providing a conducive environment for investment, we aspire to catalyse innovation and accelerate the development of cutting-edge technologies within the EV sector," Faizal shared.



HOW IS MALAYSIA ATTRACTING INVESTORS?

- >> Strategic incentive programme for EV industry
- >> Extended durations and tailored support
- >> Active engagement with investors
- >> Stability and comprehensive assistance
- >> Overcoming challenges for sustainable growth
- >> Environmental and social focus

BURGEONING GROWTH

The EV ecosystem is in a potent developmental phase, anticipating substantial growth for not just cars, but also other modes of transportation. Beyond technological advancements, the focus is on aligning policies with evolving automotive dynamics. This commitment aims to foster intelligent mobility and EV production.

The NIMP2030 strategy revolves around four missions: complexity, technology and digitalisation, net-zero compliance with ESG principles, and inclusivity and security of the EV supply chain. The goal is to transition from ICE to EV production, addressing environmental concerns and promoting inclusivity in the supply chain. Despite challenges in developing charging infrastructure for widespread EV adoption, the government target for electrified vehicles (xEVs) which consist of hybrid, battery electric vehicles and hydrogen fuel cells as stipulated in the National Energy Transition Roadmap (NETR) is 20% of the total industry volume (TIV) by 2030, with significant progress in increasing the number of charging stations, reaching 1,430 by October 2023.

“In aligning with the NETR and emphasising net-zero carbon and inclusivity, it is essential for the government to proactively address hurdles in the electrification journey, particularly in managing EV components like batteries with a well-devised end-of-life plan. As such, forward-thinking discussions on strengthening batteries for charging stations aligning with evolving recycling technologies are becoming a necessity,” noted Faizal.



AMBITIOUS ASPIRATIONS

Under the NETR, the target for annual sales of xEVs is:

- 20% by 2030
- 50% by 2040
- 80% by 2050

To achieve the abovementioned targets, a robust regulatory framework is essential. While charging station progress indicates advancement, streamlining standards for a seamless transition to electric mobility also remains a priority. Stressing on collaboration domestically and globally reflects the government’s commitment to inclusive growth and recognising the shift to high-skilled work for sustained progress.



EV TRANSITION:

- ◆ Rapid development of charging infrastructure towards achieving:
 - >> Standardisation of materials and cost
 - >> Increased charging ports to 10,000 by 2025



The growth potential for Malaysia in the EV sector lies in the country’s advantageous geographical location, talent and integration capabilities. “Despite a relatively modest population of 33 million, compared to ASEAN’s 662 million, Malaysia aims to collaborate with regional partners to capture a larger market. Leveraging raw materials for EV batteries in Indonesia and fostering collaboration on manufacturing, for example, can facilitate our endeavours in positioning ourselves as a hub for EV production,” explained Faizal.



In aligning with the NETR and emphasising net-zero carbon and inclusivity, it is essential for the government to proactively address hurdles in the electrification journey, particularly in managing EV components like batteries with a well-devised end-of-life plan. As such, forward-thinking discussions on strengthening batteries for charging stations aligning with evolving recycling technologies are becoming a necessity.





Malaysia can also look into leveraging raw materials essential for battery production from neighbouring countries, subsequently positioning ourselves as a regional hub.



In enabling inclusivity as well as the security of the EV supply chain, MITI is looking into incorporating its strengths in the electric & electronic (E&E) sector, with a focus on semiconductors.

“Just look at the automotive scene post-pandemic. There is a long wait of up to a year to purchase a car due to a shortage of chips. This is where we can attempt to integrate our E&E strength into the EV ecosystem, particularly in battery cell and battery pack production. Malaysia can also look into leveraging raw materials essential for battery production from neighbouring countries, subsequently positioning ourselves as a regional hub,” he continued.

Another crucial aspect influencing the widespread adoption of EVs is the consumer perspective. While the general consensus suggests that consumers are eagerly awaiting more accessible and widely available charging stations, affordability remains a pertinent concern.

“The cost of EVs, primarily attributed to batteries, poses a significant challenge. However, the government is actively seeking solutions to reduce costs, emphasising economies of scale for battery production,” shared Faizal.



POSITIONING AS AN EV HUB:

- >> Leveraging geographical advantage and integration capabilities
- >> Collaborating with regional partners
- >> Considering consumer perspectives
- >> Taking proactive government measures to reduce battery costs and encourage adoption



The cost of EVs, primarily attributed to batteries, poses a significant challenge. However, the government is actively seeking solutions to reduce costs, emphasising economies of scale for battery production.



The continued efforts of the government, industry players, and regulatory bodies suggest a promising trajectory for Malaysia’s evolving EV ecosystem.

“Looking ahead, a collaborative and harmonised approach is needed to overcome challenges and achieve long-term goals. Malaysia’s targets involve sustained efforts to harmonise regulations, encourage innovation, and elevate the manufacturing sector,” he elaborated.

CHAMPIONING A SUSTAINABLE FUTURE

A central focus of MITI’s efforts in reinforcing the EV ecosystem is to address the pressing need to balance the increasing demand for electricity with the imperative to reduce reliance on environmentally harmful energy sources. As a significant contributor to carbon emissions, the energy sector is prioritised when it comes to finding sustainable solutions that meet the growing energy needs of the nation without compromising environmental integrity.

According to Faizal, “The environmental impact of transportation, specifically ICE vehicles reveals a substantial burden associated with traditional transportation methods, constituting over 20% of the contribution to environmental degradation.”



Looking ahead, a collaborative and harmonised approach is needed to overcome challenges and achieve long-term goals. Malaysia’s targets involve sustained efforts to harmonise regulations, encourage innovation, and elevate the manufacturing sector.



As part of its collaborative initiatives, MITI is actively engaging with ministries and agencies to develop strategies that promote sustainable transportation practices. This includes exploring alternative fuels, enhancing public transportation infrastructure and promoting energy-efficient technologies.



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With the nation’s inherent potential for excellence in EV manufacturing, research and development, MITI’s forward-thinking initiatives, including collaborations and supportive policies, create an environment that is conducive to attracting investments and fostering innovation.

MITI’s role in shaping Malaysia’s sustainable EV future serves as a testament to the ministry’s foresight and dedication. The collaborative efforts, innovative strategies and adaptability showcased by MITI not only contribute to the nation’s economic growth and environmental stewardship but also position Malaysia as a key player in the global movement towards sustainable electric mobility.

“MITI’s demonstrated collaborative, innovative and adaptable approach is not only navigating the complexities of the present but also laying the groundwork for a sustainable and prosperous electric future. In harmonising with broader government goals, MITI showcases the harmonious coexistence of environmental sustainability and economic growth,” remarked Faizal.

As the nation takes strides towards a greener future, MITI’s continued commitment remains pivotal in nurturing a sustainable oasis that is able to stand as a beacon for generations to come.

“Embracing collaboration and innovation ensures that Malaysia’s commitment to sustainable electric mobility blossoms into a thriving green legacy for generations to come,” reminded Faizal.



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TAKING CHARGE OF THE *EV Industry*

A global paradigm shift is occurring, with many nations accelerating their efforts to adopt electric vehicles (EVs) as an integral part of their journey towards sustainability. Malaysia is holding its own while steadily making inroads in this arena.



DR. ABDUL HAKIM HASHIM
*Director of the Industrial Centre of Innovation,
Advanced Energy Storage,
SIRIM Industrial Research*

As the world increasingly recognises the importance of transitioning to electric vehicles (EVs) to combat climate change and reduce our carbon footprint, Malaysia is going full speed ahead in its pursuit of a greener, more sustainable future. SIRIM plays a central role in this transformative journey by driving innovation and supporting the growth of the EV industry in the country.

The journey began with the development of lithium batteries suitable for a range of applications. The first application of our batteries was in a remote-control car, essentially the simplest form of an EV. It was an interesting starting point as EVs aimed at young users would introduce them to the concept of eco-friendly transportation from an early age.



SIRIM's involvement in propelling Malaysia's EV industry is multi-faceted, with a focus on the research, development and testing of EV components. This initiative can be traced back to 2000 when SIRIM embarked on research into lithium-ion batteries, a pivotal component of the EV ecosystem.

"In the early stages of our journey, we delved into a treasure trove of materials, including the likes of lithium cobalt oxide (LiCoO₂), lithium manganese oxide (LiMn₂O₄), lithium iron phosphate (LiFePO₄ or LFP) and lithium nickel manganese cobalt oxide (LiNiMnCoO₂ or NMC). These were the building blocks that paved the way for SIRIM's entrance into the world of EVs," said Dr. Abdul Hakim Hashim, Director of the Industrial Centre of Innovation, Advanced Energy Storage at SIRIM Industrial Research.



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Dr. Abdul Hakim emphasised, “A pivotal moment in SIRIM’s journey came when we received a game-changing government grant. This financial boost paved the way for us to establish a cutting-edge pilot plant for battery manufacturing in Permatang Pauh. This pilot plant is dedicated to lithium iron phosphate chemistry (LFP). These batteries were initially used in motorcycles; but by 2016, they were capable of powering full-scale EVs, marking a significant milestone in SIRIM’s voyage to nurture the nation’s EV ecosystem.”

EMPOWERING THE ECOSYSTEM

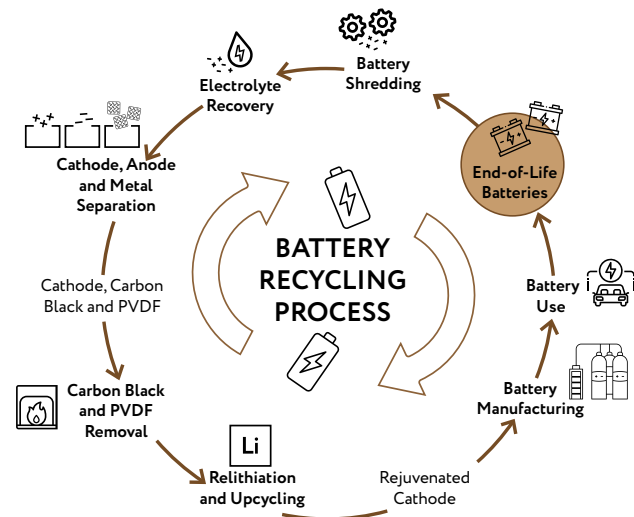
SIRIM is firmly dedicated to empowering Malaysia’s EV ecosystem, and this commitment shines through its comprehensive array of services. Its offerings cover the entire spectrum of the battery lifecycle, including the research and development, building, testing and even consultancy services on recycling EV batteries. This holistic approach effectively creates seamless solutions from beginning to end within the burgeoning EV industry.

Battery testing plays an instrumental role in ensuring the safety, performance and regulatory compliance of batteries utilised in electric vehicles. SIRIM’s comprehensive testing services are indispensable for obtaining regulatory approvals and instilling consumer trust. Meeting stringent international standards is crucial to guarantee the reliability and safety of these batteries within EVs.

In harmony with the eco-conscious principles of the EV industry, SIRIM extends its expertise to battery recycling consultancy. The recycling process is intricate, involving the careful separation of various battery components. This meticulous approach underscores the recovery of valuable materials such as lithium, cobalt, nickel and manganese via an extensive process using a hydrometallurgical processor. Responsible battery recycling is vital for minimising the



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environmental impact of EVs and promoting a circular economy. SIRIM’s multifaceted dedication exemplifies their unwavering support for the EV industry, not only in Malaysia but also on the global stage.

SIRIM has the capabilities to provide an extensive array of battery-related services and offer one-stop solutions across the entire battery lifecycle, including:

- BUILDING BATTERIES**, inclusive of the research and development process, for assembly in EVs utilising hydrogen & lithium sources
- COMPREHENSIVE TESTING** to ensure the safety and performance of the batteries as well as compliance with related regulations
- RECYCLING CONSULTANCY** to educate and guide industry players on the elaborate process of recycling the battery components, ensure the recovery of valuable materials & facilitate a circular ecosystem

“At SIRIM, our unique selling point lies in our ability to offer a comprehensive ecosystem that supports the entire battery lifecycle. This holistic approach ensures that batteries are developed and tested as well as being recycled in an environmentally sustainable manner. It positions SIRIM as a one-stop solution provider for the EV industry,” shared Dr. Abdul Hakim.

NOTCHING NEW MILESTONES

With the EV industry being relatively new, SIRIM is unwavering in its efforts to reinforce its growth and development. This includes the establishment of the upcoming National Rechargeable Battery Testing Centre (NRBTC), which is set to be a significant milestone both for SIRIM and the broader Malaysian EV ecosystem.

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In Malaysia, gaining approval from the Road Transport Department (JPJ) for selling EVs involves vehicle type approval. As part of this approval process, batteries used in EVs need to be proven safe and workable to ensure they do not pose any problems to consumers. To meet these criteria, batteries are tested according to international standards, such as the ECE R100, a European-level requirement for EVs.

Battery Testing → ECE R100 Safety & Performance Assured → Submission to JPJ → Installation in EVs



EXPLAINING ECE R100

ECE R100 is essential for the approval of road EVs. It lists all the tests that are needed for lithium batteries used for category M and N four-wheel EVs that transport people or goods. Widely recognised, the regulation is aimed at ensuring globally harmonised regulations for motor vehicles in order to remove barriers to international trade, promote road safety and protect the environment.

The NRBTC is poised to become a linchpin in the testing of large-format batteries utilised in EVs and energy storage, further fortifying the expanding EV landscape in the nation.

According to Dr. Abdul Hakim, “The NRBTC is poised to become a linchpin in the testing of large-format batteries utilised in EVs and energy storage, further fortifying the expanding EV landscape in the nation.”

The NRBTC’s paramount importance lies in its capacity to ensure that batteries used in electric vehicles and energy storage systems meet strict safety and performance standards, serving not only as a regulatory prerequisite but also as a crucial element in establishing trust among consumers and industry stakeholders. With the imminent launch of the NRBTC, SIRIM is strategically positioned to strengthen the Malaysian EV ecosystem, actively contributing to its ongoing growth and development. Consequently, the NRBTC stands as a testament to SIRIM’s forward-thinking approach in supporting Malaysia’s EV industry, as this cutting-edge facility is intricately designed to provide a comprehensive array of testing services, with a particular focus on batteries tailored for EVs and energy storage solutions.

Despite the inroads that SIRIM has made in reinforcing the nation’s EV ecosystem, proper funding is essential to ensure its continued progress.

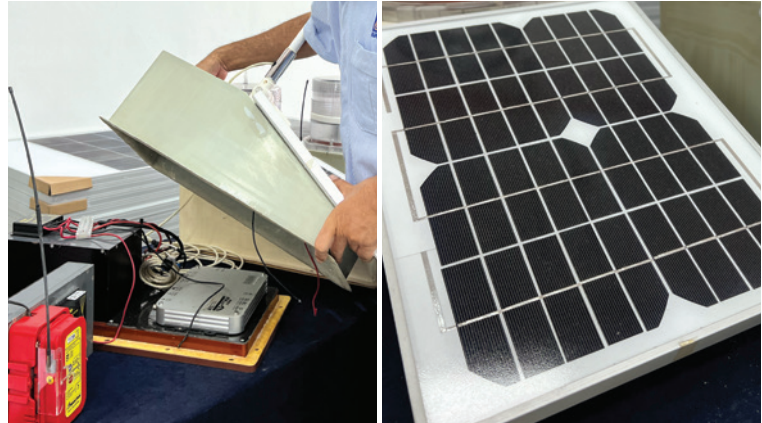
“Financial support is essential for conducting research and development activities, especially in a rapidly evolving field like the EV industry. As research projects often require substantial resources, securing funding is a critical aspect of advancing the industry,” said Dr. Abdul Hakim.

He noted that getting grants and funding has become increasingly





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competitive in recent years, emphasising the need to explore various avenues to ensure sustainable funding for research and development in the EV ecosystem. Collaborating with government bodies, private industry partners and international stakeholders is part of SIRIM’s strategy to overcome this obstacle and continue its vital work in advancing the EV industry.

Besides that, the size and weight of EV batteries can also be a challenge. For example, smaller batteries in motorcycles may allow for battery swapping options, thus creating an accessible marketplace; however, the larger and heavier EV batteries for bigger vehicles, which could weigh between 500kg and 700kg, could present substantial logistical challenges. In addressing this issue, finding high performance batteries that allow higher energy density and faster charging, instead, may be a more feasible option.

ROADMAP TOWARDS SUCCESS

Moving forward, the ultimate goal for Malaysia’s EV sector revolves around addressing the concerns of consumers and fostering widespread EV adoption. In terms of batteries, SIRIM aspires to reinforce its capabilities and enhance its potential in research, development and testing of batteries.

“This includes battery packs for EVs, equipped with advanced battery management systems. Looking ahead, we are actively exploring the emerging sodium ion battery technology. In the midst of our research process, we have successfully produced small-scale prototypes. Our next step is to transition to pilot production, which will enable us to explore a wider range of applications and possibilities,” said Dr. Abdul Hakim.

He also stressed on the common consumer perception that batteries take too long to charge and replacing a depleted battery can be an expensive endeavour, often accounting for a substantial portion of an EV’s cost. Ideally, he envisions a future with fast-charging batteries, where a full charge can be achieved in five to 10 minutes. This would allow EV users to confidently embark on long journeys, such as from Kulim to Shah Alam and beyond.



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POWERING PROGRESS

The NRBTC signifies more than just progress. It is a narrative of bridging research, manufacturing and tangible impact, a commitment to stringent quality assurance that ensures not just innovation but a reliable shift towards a sustainable energy landscape.

MILESTONES	DESCRIPTION
Material Research	Inception Stage Extensive research on advanced materials for energy storage
Pilot Manufacturing	Prototyping Transition to the production of prototype batteries
Application Integration	Real-world Solutions Implementation in EVs and solar streetlights
Testing Centre	Quality Assurance Establishment of a dedicated testing facility
Future Innovations	Ongoing progress A commitment to advancing energy technology for a sustainable future

In efforts to enhance the EV ecosystem, the installation of additional EV charging stations and the use of sodium-ion batteries stand out as promising strategies. However, a significant challenge stems from the inherent characteristics of EV batteries, which lead to extended charging times.

Dr. Abdul Hakim also emphasised the importance of government incentives in promoting EV adoption. Taking a page from China’s playbook, where government support has played a critical role in making EVs more accessible to consumers, he shared, “Malaysia can draw inspiration from China’s innovative and controversial system, where EV batteries can be rapidly swapped at charging stations, offering an enticing alternative to extend the range of electric vehicles. Four companies – automakers Nio and Geely, battery swap developer Aulton and state-owned oil producer Sinopec – said they plan to establish a total of 24,000 swap stations across the country by 2025, up from about 1,400 today. These forward-thinking approaches underscore the vital role of continuous research and development in advancing EV battery technology for a more sustainable and efficient future of mobility.”



Malaysia can draw inspiration from China’s innovative and controversial system, where EV batteries can be rapidly swapped at charging stations, offering an enticing alternative to extend the range of electric vehicles. Four companies – automakers Nio and Geely, battery swap developer Aulton and state-owned oil producer Sinopec – said they plan to establish a total of 24,000 swap stations across the country by 2025, up from about 1,400 today. These forward-thinking approaches underscore the vital role of continuous research and development in advancing EV battery technology for a more sustainable and efficient future of mobility.



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SYARIZAL ZAINAL ABIDIN
Metrologist at the National Metrology Institute of Malaysia (NMIM)

METROLOGY'S IMPORTANCE IN THE WORLD OF *Electric Vehicles*

Rooted in the science of measurement, metrology is instrumental in the electric vehicle (EV) ecosystem. In determining the accuracy and reliability of the EV, it is stringently employed across the entire value chain, including battery performance and charging station standards.

Malaysia has been zeroing in on increasing the popularity of electric vehicles (EVs) as part of its efforts to cut carbon emissions. While still relatively new, the EV industry has been experiencing a growth spurt with a predicted annual expansion rate of 4.95%, paving the way for the country to become a major player in the regional EV industry by 2029.

To support the rapid growth trajectory of the EV industry, metrology will have to play an essential role. "Metrology is one of the industries that is vital to the advancement of EVs. It ensures precise measurements, calibration and standardised practices. These factors contribute to the overall safety, performance and trustworthiness of EVs in the automotive industry," said Syarizal Zainal Abidin, a Metrologist at the National Metrology Institute of Malaysia (NMIM).

Metrology is one of the industries that is vital to the advancement of EVs. It ensures precise measurements, calibration and standardised practices. These factors contribute to the overall safety, performance and trustworthiness of EVs in the automotive industry.

Obtaining precise measurements is critical to ensuring the quality of EV components and their assembly. The precision of these measures is significantly impacted by the production process. It is very important to adhere to specified tolerances in order to consistently achieve positive results in production.

Firstly, metrology is crucial in quality control, ensuring the precision and accuracy of EV parts and components during the manufacturing process. Precision, for instance, is needed to fulfil strict tolerances and regulations, particularly when it comes to battery safety.

"Obtaining precise measurements is critical to ensuring the quality of EV components and their assembly. The precision of these measures is significantly impacted by the production process. It is very important to adhere to specified tolerances in order to consistently achieve positive results in production," explained Syarizal.

Accurate high-voltage measurements of battery cells and components, for example, will improve EV performance, capacity and durability.

THE ROLE OF METROLOGY IN EV MANUFACTURING



Quality Control



Innovation



Compliance with Regulations



Consumer Trust



Metrology is also an important tool in ensuring compliance with strict regulations governing the safety, emissions and overall performance in the broader context of the EV trade. Metrology's commitment to precision ensures that EVs meet acceptable requirements on a continuous basis by meticulously testing measurements and components against set standards.

Besides that, the development of new EV technologies and materials is heavily reliant on precise measurements, which metrology constantly ensures. Precision measurements are used by researchers and engineers to design and test new materials and components. For example, metrology is utilised to develop batteries and quick-charging components in order to create more efficient and high-performance EVs.

"We prioritise designing and testing new materials and components for EVs in addition to meeting regulatory requirements. We not only improve the efficiency of EV performance, including battery technology, through rigorous testing and recent measurements, but we also drive the development of cutting-edge fast-charging solutions for these components," stated Syarizal.

Metrology, by emphasising regulatory compliance and technological progress, can be seen as the glue that fosters innovation in the EV market. This is because consumer trust in this industry is heavily reliant on the availability of high-quality, dependable vehicles.

"Metrology plays an important role in ensuring that the EVs not only meet but exceed performance and safety expectations, which will also significantly contribute to manufacturers' success and reputation. As a result of a fair trade between consumers and charging point operators (CPOs), consumers' trust in the dependability and safety of EVs grows," continued Syarizal.

It has been demonstrated how important metrology is in establishing and maintaining trust in the unpredictable EV market. According to Syarizal, NMIM uses stringent and time-tested testing methods to assemble and maintain the quality of EV components. To obtain accurate measurements and ensure safety in EV batteries, for example, everything from well-equipped labs to knowledgeable technicians, standards and designs must be in sync to ensure that the EV that eventually reaches consumers is of high quality and safe to use.



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GAUGING ENERGY PERFORMANCE AT CHARGING STATIONS

NMIM adheres to three EV parameters for this purpose:

- 1 >> The charging station's power
- 2 >> The duration it takes for the EV to be fully charged
- 3 >> The software used to measure the necessary parameters and ensure all components are in good working order



ACCOMMODATING THE EVOLVING NEEDS OF THE INDUSTRY

Syarizal points out the importance of comprehensive metrology adaptation to meet the expectations of Malaysia’s EV charging business. This adaption means broadening its scope beyond NMIM to include the entire metrology value chain. NMIM will continue to collaborate with other accredited testing and calibration institutes within the national EV ecosystem to meet the needs of the industry.

As the country’s reference point for standardised measurements, NMIM is well-positioned to be the precision partner for EV. “We are tasked with establishing standardised measurement units for critical aspects of EV charging in accordance with the National Measurement System Act 2007 (Act 675). This mandate ensures consistency across diverse charging stations and EV models by ensuring uniformity in energy consumption, power output and charging time,” noted Syarizal.



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In order to ensure that Malaysia’s meteorological processes are in line with internationally accepted standards, we maintain international collaborations and partnerships with regional metrology organisations (RMO) and standards bodies. This collaboration ensures the improvement of the EV industry on a global scale.



Furthermore, through consultations, NMIM works with regulators such as the Energy Commission (Suruhanjaya Tenaga or ST) and the Ministry of Domestic Trade and Cost of Living (KPDN) to develop systematic rules and regulations. These entities work together to conduct testing, audits and inspections to ensure that the charging infrastructures meet safety, performance and regulatory requirements.

NMIM also offers calibration and pattern approval certification services for EV charging equipment, providing precise and reliable measurements. Such precision is essential for billing and safety, as it reduces inaccuracies in energy and power measurements.

For the former, consumers need to be assured that they are receiving the accurate charging power that they pay for at charging stations. In this regard, charging stations require verification from qualified individuals to ensure that discrepancies do not occur.

Additionally, NMIM is also advancing the EV charging industry through focused research and development initiatives. “The institute conducts essential research on EV supply equipment, including chargers, with a focus on developing measurement techniques for emerging technologies such as wireless charging and fast-charging systems,” Syarizal explained.

The Education and Training sector at NMIM is equally important to equip technicians and engineers in the industry with the latest knowledge and technology. This is done with the provision of programmes that emphasise the significance of accurate measurements and proper metrological practices for EV supply equipment.

“In order to ensure that Malaysia’s meteorological processes are in line with internationally accepted standards, we maintain international collaborations and partnerships with regional metrology organisations (RMO) and standards bodies. This collaboration ensures the improvement of the EV industry on a global scale,” added Syarizal.



DID YOU KNOW?

Pattern approval for EV chargers is regulated by NMIM under the Weights and Measures Act 1972 (Act 71) and Act 675.

PATTERN APPROVAL IN MALAYSIA’S EV LANDSCAPE

NMIM is prepared to serve Malaysia’s EV ecosystem, having obtained a grant from the Ministry of Investment, Trade and Industry (MITI) to build technical expertises relating to pattern approval, calibration, testing and functions outlined in Act 675.

“To provide exceptional service to various industries, our personnel undergo rigorous training and maintain competence to meet all the required parameters. With ISO 1705 certification and international laboratory comparisons, NMIM ensures our staff members’ competence globally, reflecting our commitment to excellence and standing out as a benchmark among the best in the world,” said Syarizal.

“As mandated by Act 675, we at NMIM uphold the responsibility of pattern approval for EV chargers in Malaysia. We conduct pattern approval, calibration and measurements related to the EV ecosystem using our technical capability and expertise, ensuring traceability based on the International System of Units throughout the country,” he added.



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Pattern approval is required for EV chargers intended for commercial or other legal use. Manufacturers, importers and suppliers that want to market EV charging systems in Malaysia must first obtain pattern approval from NMIM. NMIM works collaboratively with industry associations, government agencies and other stakeholders to ensure that manufacturers, distributors and CPOs understand the pattern approval process and the critical importance of standard compliance.

This process ensures that EV chargers comply with specified regulatory, safety and technical standards, as well as the Electric Power Supply Regulations 1994, which are overseen by the ST.

“Pattern approval is critical in the current EV climate for a variety of reasons. For starters, it ensures that EV chargers meet stringent safety standards, ensuring that they are safe to operate in Malaysia’s diverse environmental conditions,” said Syarizal.

Furthermore, pattern approval encourages compatibility and standardisation among various EV chargers and vehicles, resulting in an easy and dependable charging experience among EV consumers. This is especially important given the wide range of charging connectors and technologies used by different suppliers. Finally, pattern approval aims to improve the efficiency of EV chargers by shortening charging times and increasing the grid’s total energy efficiency.



As mandated by Act 675, we at NMIM uphold the responsibility of pattern approval for EV chargers in Malaysia. We conduct pattern approval, calibration and measurements related to the EV ecosystem using our technical capability and expertise, ensuring traceability based on the International System of Units throughout the country.



“EV charger pattern approval is more than just a regulatory requirement; it is a critical step in ensuring the safety, compatibility and efficiency of Malaysia’s EV charging infrastructure. By adhering to stringent standards, we not only protect users but also foster a reliable and standardised charging experience, which is critical for the successful integration of EVs into our transportation landscape,” Syarizal explained.

There are three key steps in the pattern approval process. The first stage encompasses the review of relevant documentations and assessments. NMIM reviews all the necessary documents, test results and compliance assessments to determine whether the pattern or design complies with the OIML G22 requirements.

The prototype is then tested and evaluated for accuracy to ensure that it meets the set requirements. If the pattern fails to meet these criteria, necessary changes and enhancements are made to assure compliance.

After modifications are made, additional testing and evaluations are performed to ensure that the pattern now meets the appropriate standards. NMIM conducts a final review to ensure that all criteria and standards are met. Following that, a pattern approval decision is made, which may include acceptance, rejection or conditional approval.

“In the journey towards pattern approval, NMIM meticulously scrutinises designs, conducts rigorous testing and ensures that every step aligns with the standards outlined in OIML G22, making informed decisions for acceptance, rejection or conditional approval,” shared Syarizal.

EMPOWERING STAKEHOLDERS

NMIM is actively promoting awareness about the need for pattern approval for EV charger industry participants and consumers. Among others, it held a detailed briefing event in early 2023, educating industry stakeholders, CPOs and government authorities on the relevance of pattern approval. The emphasis was on metrological control in order to verify the accuracy of electric car charger system measurements, to avoid fraudulent operations and to protect consumer rights. NMIM continues its outreach by actively participating in discussions, seminars and collaboration with other entities such as SIRIM QAS International Sdn Bhd and SIRIM Industrial Research.

“Our comprehensive outreach, from briefing sessions to active participation in industry events, has garnered a positive response, underlining our commitment to advancing the EV charging landscape,” Syarizal said.

He is confident that the EV industry will continue to thrive, supported by NMIM’s expertise and experience, and be able to meet the government’s goal of becoming a major regional player within the next five to seven years.



OIML G22 provides a blueprint for type-testing procedures and requirements. It is developed by the International Organisation of Legal Metrology (OIML), a worldwide, intergovernmental organisation.

“We expect to see significant growth once the industry understands the importance of pattern approval and how it can benefit them in terms of marketing their product,” he added.



EV charger pattern approval is more than just a regulatory requirement; it is a critical step in ensuring the safety, compatibility and efficiency of Malaysia’s EV charging infrastructure. By adhering to stringent standards, we not only protect users but also foster a reliable and standardised charging experience, which is critical for the successful integration of EVs into our transportation landscape.



THREE KEY STEPS FOR THE PATTERN APPROVAL PROCESS

- 1 **Document and evaluation review** to determine compliance with OIML G22 guidelines
- 2 **Testing and evaluating accuracy** of the prototype to ensure that it meets set criteria; any inconsistencies result in necessary revisions for compliance
- 3 **Final review** to confirm that the pattern meets all criteria and requirements

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CATALYSING INNOVATION IN *Electric Mobility*

The upcoming National Rechargeable Battery Testing Centre (NRBTC) has captured widespread attention as the first of its kind in Malaysia. All eyes are focused on this groundbreaking centre, which is set to transform the electric vehicle (EV) industry in the country.



DR. MD AZMAN SEENI MOHAMED
Director of the Industrial Centre of Innovation – Biomedical Department, SIRIM Industrial Research

Batteries are the heart of electric vehicles (EVs). Amidst a flourishing EV industry in Malaysia, it is essential to prioritise their performance and safety. This is where rigorous battery testing comes in. To facilitate this, SIRIM conceived the National Rechargeable Battery Testing Centre (NRBTC), a driving force aimed at propelling the country's EV industry into the future.

Spearheading the transition in EV technology, Dr. Md Azman Seeni Mohamed, Director of the Industrial Centre of Innovation in the Biomedical Department at SIRIM Industrial Research, underscores the NRBTC's pivotal role in ensuring the safety, quality and reliability of EV batteries. This commitment not only solidifies Malaysia's position in sustainable transportation but also establishes the nation as a key global player in the green revolution. With a dedicated team, a focus on innovation and the flexibility to adapt, the NRBTC stands as a cornerstone in shaping Malaysia's sustainable and eco-friendly automotive future, offering essential facilities and pursuing ambitious goals to advance the country's presence in the EV industry.

According to Dr. Md Azman, "Malaysia is proactively investing in EV technology. The NRBTC symbolises Malaysia's determination to harness the potential of the rapidly evolving EV industry and secure its place in the world of green transportation."



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A BURGEONING ECOSYSTEM

Recent substantial investments in EVs, such as Cherry China's RM170 million venture in the first batch of pre-delivery inspection at Kulim and commitments exceeding RM400 million from three other major groups, have underscored the necessity for certified battery testing facilities to ensure that EV batteries meet rigorous safety, efficiency and reliability standards. As Malaysia's sole battery testing centre, the NRBTC will be instrumental in meeting this demand.



Local car manufacturers like Perodua and Proton are also entering the EV market. While Proton has initiated an in-house testing centre for EVs, there is a need for an independent certified body.

“The NRBTC will fill this role, standardising and testing batteries for Malaysia’s EV industry. One of the centre’s primary roles will be to justify whether the EV batteries being produced are in good condition and ensure that they meet the stringent standards for performance and safety,” said Dr. Md Azman.

The NRBTC has established a comprehensive battery testing procedure, beginning with the assessment of individual battery cells and modules. Electrical, mechanical and thermal testing will be conducted to determine the battery’s suitability for use. These tests follow international standards, which are adapted to Malaysia’s unique environmental conditions, highlighting the country’s commitment to advancing its EV capabilities.

The centre’s services extend beyond Malaysia, serving neighbouring countries like Thailand, Brunei and Singapore. It aims to provide superior testing services at a competitive cost, positioning itself as a key player in the EV battery industry.

EPITOME OF EXCELLENCE

The NRBTC boasts distinctive strengths and unique selling propositions deeply anchored in its exceptional expertise and adaptability in the realm of battery testing. At the core of this testing centre lies its commitment to scientific and engineering excellence.

The centre takes pride in housing a team of scientists and engineers, setting it apart from conventional testing and calibration facilities. This distinctive blend of expertise empowers the centre to transcend established testing protocols. It not only rigorously adheres to international standards but also possesses the capacity to adapt to evolving industry requirements and even pioneer the development of new testing procedures.

◆ *The NRBTC will fill this role, standardising and testing batteries for Malaysia’s EV industry. One of the centre’s primary roles will be to justify whether the EV batteries being produced are in good condition and ensure that they meet the stringent standards for performance and safety.*



BATTERY TESTING PROCESS AT THE NRBTC

Battery Intake

Receive batteries from local or foreign manufacturers

Initial Inspection:

Inspect for physical damage or defects

CELL AND MODULE TESTING

Electrical Testing:

Test the electrical performance of individual cells and modules

Mechanical Testing:

Assess the mechanical integrity of the cells and modules

Thermal Testing:

Evaluate the thermal behaviour and stability of cells and modules

Packaging Evaluation:

Examine the packaging used for transportation and installation

Quality Assessment:

Determine whether the batteries meet international aggregation standards and adapt international standards to local environmental conditions (e.g., climate, temperature)

Safety Considerations:

Address safety concerns during battery transportation

Cost Analysis:

Assess the cost of battery shipping and testing

“With our highly trained and experienced team, the NRBTC stands well-prepared for potential advancements in battery technology. Whether the industry shifts towards hydrogen-based batteries or experiences groundbreaking developments in EV battery technology, the centre is uniquely equipped to confront these challenges head-on,” shared Dr. Md Azman.

The competitive edge of the NRBTC is further validated by its proven track record. It has a history of successful collaborations with organisations such as Proton, where it contributed to the development and testing of the first EV batteries for Proton vehicles before the local manufacturer had its in-house testing facilities.



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A COMPETITIVE ADVANTAGE



Scientific and Engineering Expertise



Adaptability to Future Technologies



Proven Track Record



Speed, Timeliness & Cost-Effectiveness

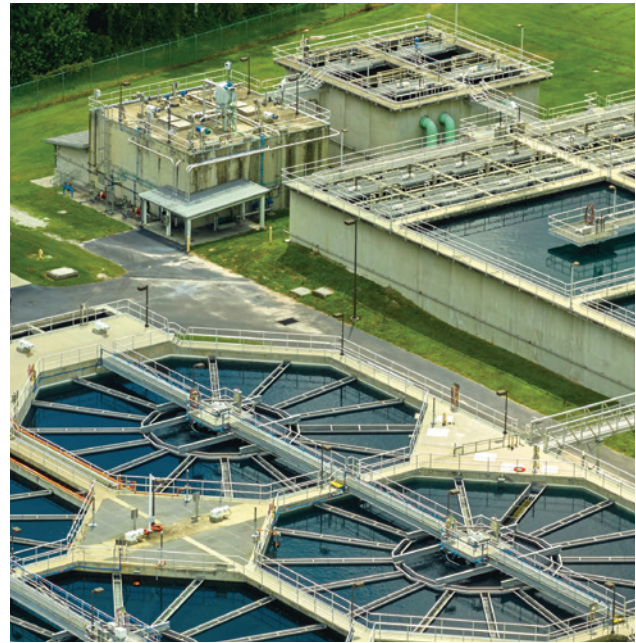
This exemplifies the NRBTC's profound knowledge and practical experience in the field.

In addition to that, the NRBTC has an unwavering commitment to providing fast, timely and cost-effective services. It aspires to be more than just a testing centre; it aims to be an innovation partner that drives industry advancements. This proactive approach solidifies its position as a forward-thinking and invaluable asset to the battery technology industry, both locally and internationally.

Upon officially opening its doors, the NRBTC's primary focus is on achieving a critical milestone: completing the foundational phase of its establishment to ensure full operational readiness. The goal is to develop the necessary infrastructure, resources, and technical expertise for rigorous electrical testing on batteries and energy storage systems.

As for the long term, the NRBTC aims to extend its influence beyond Malaysia's borders and become a reference centre for the ASEAN region.

"Our overarching goal is to set industry standards and best practices in battery testing and certification, offering services to local and foreign manufacturers. This includes cutting-edge research, advanced testing methodologies, and safety certification for energy storage solutions, facilitating knowledge transfer and technological progress among ASEAN nations," shared Dr. Md Azman.



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NAVIGATING THE EV LANDSCAPE

Amidst the prevailing global shift towards EVs and the promising potential they hold in replacing traditional combustion engine vehicles, a dedicated facility like the NRBTC is set to play an instrumental role. This need becomes even more critical with the growing participation of local car manufacturers and the entry of international companies into the Malaysian market.

The NRBTC's contributions to the national EV ecosystem are multifaceted. In addition to serving as a central hub for testing and certifying renewable batteries, and ensuring their quality and environmental sustainability, the facility plays a critical role in attracting investment from EV industry players.

"These automotive players may have the intention to make their mark in the EV industry in Malaysia. However, without a proper testing centre easily available, it might be more onerous for them to establish themselves. In this context, the facility becomes a significant attraction for them," explained Dr. Md Azman.



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EMBRACING EVs

EVs represent a pivotal component of the global movement towards sustainable transportation, offering advantages like reduced maintenance, lower emissions and cost-efficiency. Malaysia, along with other nations, recognises the importance of investing in EV infrastructures to maintain competitiveness within the automotive industry.

Malaysia's commitment to sustainability and EV adoption includes:

- **EV Infrastructure:** Invest in EV charging to support its growing electric vehicle numbers
- **Green Energy:** Promote renewable energy to reduce carbon emissions
- **Research and Development for Sustainability:** Encourage sustainable energy research for a greener future
- **Supportive Policies:** Implement EV-friendly policies and incentives
- **International Collaboration:** Partner globally to exchange sustainability and EV best practices
- **Awareness and Education:** Educate the public on sustainable energy and EV benefits
- **Environmental Stewardship:** Reduce carbon footprint through sustainable practices



EV technology aligns with the country's goals of reducing carbon emissions and transitioning to cleaner energy sources. The NRBTC's contribution lies in providing a testing and certification hub for EV batteries, ensuring that they meet stringent quality and safety standards. This, in turn, attracts foreign investors and manufacturers, fostering economic growth while advancing Malaysia's sustainability journey.



With ongoing efforts to advance Malaysia's net zero carbon emission goals and foster a thriving national EV ecosystem, the establishment of NRBTC is a pivotal development.

"EV technology aligns with the country's goals of reducing carbon emissions and transitioning to cleaner energy sources. The NRBTC's contribution lies in providing a testing and certification hub for EV batteries, ensuring that they meet stringent quality and safety standards. This, in turn, attracts foreign investors and manufacturers, fostering economic growth while advancing Malaysia's sustainability journey," pointed out Dr. Md Azman.



LOOKING OUTWARD

While the NRBTC is well-positioned in the local market, venturing into international markets requires strategic planning and adaptability. One of the primary challenges stems from it being a new player in the global EV industry, despite possessing the necessary knowledge and expertise.

The uncertainty surrounding the future of the EV industry's business model compounds these challenges. With various players investing and evolving rapidly, predicting the precise direction of the industry remains elusive.

"It is difficult trying to estimate the costs involved and other business aspects because the business is still taking shape. Nobody knows how it will evolve," noted Dr. Md Azman.

In light of these challenges, the NRBTC is learning from neighbouring countries, and implementing successful strategies to address local issues first before penetrating foreign markets. To put this knowledge into use, the organisation is proactively forming

partnerships and fostering collaborations with industry players to navigate the evolving industry landscape together and adapt to emerging business models.

Despite the uncertainties and challenges in foreign markets, the interest shown by international companies is an encouraging sign. "These partnerships not only signify growing interest in the NRBTC but also indicate a readiness to adapt to the evolving industry landscape and work towards sustainable solutions in the global EV ecosystem," said Dr. Md Azman



These partnerships not only signify growing interest in the NRBTC but also indicate a readiness to adapt to the evolving industry landscape and work towards sustainable solutions in the global EV ecosystem.



CHALLENGES FACED

- << New Entrant in Foreign Markets
- << Uncertain and Constantly Evolving EV Business Model

STRATEGIES IMPLEMENTED

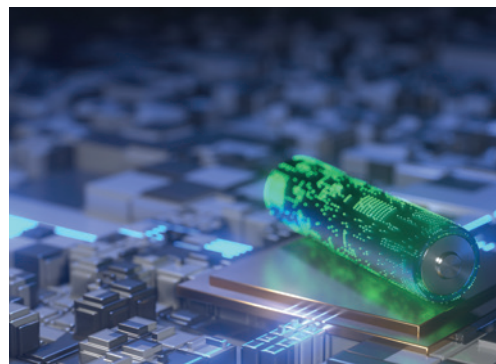
- >> Strategic Partnerships
- >> Learning from Neighbours
- >> Local Market Focus



ANTICIPATING INNOVATIONS

While no significant issues are currently on the horizon, the NRBTC recognises the importance of readiness and innovation.

One particular area of concern centres on safety, particularly in the event of a battery-related incident involving EVs, such as a spike or explosion. Conventional firefighting methods may prove inadequate for handling such situations due to the unique characteristics of EVs.



"We will need to figure out how we can overcome such challenges. In this case, the methods employed by traditional firefighters are ill-suited for these circumstances, as they are tailored for other types of vehicles and climates. It's a completely different scenario," pondered Dr. Md Azman.



Our team is deeply committed to exploring novel and effective solutions for addressing any potential issues that might arise within the EV industry. This is why we are exceptionally unique and fully prepared to face this challenge as well as embracing our role in uplifting the country's EV ecosystem.



The NRBTC stands prepared to collaborate closely with relevant authorities and emergency response teams to formulate specialised procedures and techniques for managing EV-related emergencies. Its expertise in battery technology and profound understanding of EV-specific risks make the centre an invaluable resource in such critical situations.

Moreover, the NRBTC team takes pride in its innovative spirit. "Our team is deeply committed to exploring novel and effective solutions for addressing any potential issues that might arise within the EV industry. This is why we are exceptionally unique and fully prepared to face this challenge as well as embracing our role in uplifting the country's EV ecosystem," observed Dr. Md Azman.

For more information, kindly contact: _____



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MUHAMAD KAMAL SABRAN
 Head of Electrical & Electronics Certification and Inspection Section at SIRIM QAS International Sdn Bhd (SIRIM QAS International)

Charging Up FOR THE FUTURE

The anticipated surge in electric vehicle (EV) adoption in Malaysia is catalysing the development of a robust charging infrastructure, reflecting a progressive step forward towards a more sustainable future for the country's transportation sector.

An Electric Vehicle Charging System (EVCS) consists of various components and infrastructure designed to charge electric vehicles (EVs). The key components of an EVCS include:

- ◆ Charging Station
- ◆ EV Charging Cable
- ◆ Electric Vehicle Supply Equipment (EVSE)
- ◆ Power Supply

"The charging station is the physical device to which the EV is connected for charging. These come in various types. Mode Three (Wall Box) and Mode Four (DC Fast Chargers) are the more common ones, with Mode Three being the prevalent charging mode in Malaysia," said Muhamad Kamal Sabran, Head of Electrical & Electronics Certification and Inspection Section at SIRIM QAS International Sdn Bhd (SIRIM QAS International).

These are extensively available in shopping malls and on highways, and therefore favoured for their public accessibility. However, Mode Three charging isn't fast due to its use of Alternating Current (AC), taking seven to eight hours for a full EV charge.

Recognising the need for speed, the government is also urging Charging Point Operators (CPOs) to deploy Mode Four (DC Fast Chargers), which delivers high-voltage Direct Current (DC) directly to the EV's battery, offering a remarkably swift charging experience of less than 30 minutes.

"The government plans to install at least 10,000 units by



The charging station is the physical device to which the EV is connected for charging. These come in various types. Mode Three (Wall Box) and Mode Four (DC Fast Chargers) are the more common ones, with Mode Three being the prevalent charging mode in Malaysia.



2025, with around 90% of these being Mode Three, due to its cheaper assembly cost. Nevertheless, the Energy Commission (Suruhanjaya Tenaga or ST) is currently granting exemptions for CPOs installing Mode Four chargers for public use," explained Muhamad Kamal.



The government plans to install at least 10,000 units by 2025, with around 90% of these being Mode Three, due to its cheaper assembly cost. Nevertheless, the Energy Commission (Suruhanjaya Tenaga or ST) is currently granting exemptions for CPOs installing Mode Four chargers for public use.



Mode Three Wall Box	Mode Four DC Fast Charger
Requires 7 - 8 hours of charging time	Takes around 30 minutes of charging time
Uses Alternating Current (AC)	Uses Direct Current (DC)



Apart from charging stations, an EVCS also requires an EV charging cable to connect to the EV. Muhamad Kamal emphasised the importance of these cables meeting standards such as IEC 62893-3:2017 and IEC 62893-4-2:2021. For instance, the IEC 62893-3 standard applies to charging cables for EVs with cable rated voltages up to 0.6/1 kV.

Additionally, there's the Electric Vehicle Supply Equipment (EVSE), which manages the power flow between the charging station and the EV. Furthermore, an EVCS requires a source of electrical power, which can be the electrical grid for home chargers or a dedicated electrical supply for public charging stations.

Besides that, an EVCS would encompass user interfaces, like touch screens or mobile apps, enabling them to control charging, track progress and make payments. The EVCS should also boast safety mechanisms, guarding against electrical faults, overheating and unauthorised access.

BENCHMARK OF QUALITY

There are standards designated for the respective EVCS components. These encompass

Component	Applicable Standard(s)
Mode Three (Wall Box)	<u>IEC 61851-1:2017 or MS IEC 61851-1:2021</u> Electric vehicle conductive charging system - Part 1: General requirements
	<u>IEC 62196-1:2014 or MS IEC 62196-1:2021</u> Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements
Mode Four (DC fast chargers)	<u>IEC 61851-21-1:2017 or MS IEC 61851-21-1:2021</u> Electric vehicle conductive charging system - Part 21-1 Electric vehicle on-board charger EMC requirements for conductive connection to AC/ DC supply
	<u>IEC 62196-1:2014 or MS IEC 62196-1:2021</u> Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements
EV Charging Cable	<u>IEC 62893-3:2017</u> Charging cables for electric vehicles for cable rated voltages up to and including 0,6/1 kV - Part 3: Cables for AC charging according to modes 1, 2 and 3 of IEC 61851-1 of cable rated voltages up to and including 450/750V
	<u>IEC 62893-4-1:2020</u> Charging cables for electric vehicles of cable rated voltages up to and including 0,6/1 kV - Part 4-1: Cables for DC charging according to mode 4 of IEC 61851-1 - DC charging without use of a thermal management system
	<u>IEC 62893-4-2:2021</u> Charging cables for electric vehicles of cable rated voltages up to and including 0,6/1 kV - Part 4-2: Cables for DC charging according to mode 4 of IEC 61851-1 - Cables intended to be used with a thermal management system.

FOSTERING GROWTH

“While still in a relatively early stage compared to other nations like Europe, the US and China, Malaysia is making strong efforts to facilitate the growth of the EV industry and related infrastructures, including the EVCS,” said Muhamad Kamal.

The government’s keen interest is reflected in the formation of the EV Task Force under the Ministry of Investment, Trade and Industry (MITI) in November 2020, with Muhamad Kamal being one of its members.

“The EV Task Force was established to enhance existing strategies related to EVs and establish new ones for a more comprehensive, effective and investor-friendly direction. There are also ongoing initiatives to encourage EV adoption and the development of charging infrastructure,” he continued.

Numerous industry stakeholders are actively engaged in Malaysia’s EVCS sector. These include private companies, including GENTARI by Petronas, government bodies, utility companies such as ELECTRON under Tenaga Nasional Berhad (TNB), renowned automotive manufacturers like Tesla and BYD, highway operators such as Plus and startups. Notably, the startup company UMWA recently signed a memorandum with SIRIM, solidifying its commitment to charging infrastructure development and services.

Malaysia is in the process of catching up with global leaders in the EV and EVCS sectors. “The quality and standards of charging infrastructure are gradually improving with a mix of Mode Three and Four chargers in operation. We are also steadily building the DC charging network in the country,” explained Muhamad Kamal.

The country’s slower growth in the EVCS sector is attributed to the comparatively smaller size of its domestic automotive market. While infrastructure investment is gradually increasing, building a comprehensive network of charging stations across the country necessitates significant time and capital.

“The guidelines for establishing an EVCS are currently under development by government agencies such as the ST, the Fire and Rescue Department (Bomba) and Ministry of Housing and Local Government (KPKT). This is expected to be completed by the middle of next year, and we hope to see a significant increase in the numbers thereafter,” said Muhamad Kamal.

The readiness of Malaysia’s EVCSs to meet the demands of a rapidly progressing EV market depends on several factors and considerations. “To support the growth of EVs, Malaysia needs to significantly expand its charging infrastructure network. This involves deploying more charging stations in urban areas, along highways and in public spaces to ensure convenient and widespread access for EV owners,” noted Muhamad Kamal.

He highlights the essential role of public-private partnerships in the rapid expansion of charging infrastructure. Collaboration among the government, utility companies, and private-sector stakeholders is crucial for streamlining investments and ensuring efficient deployment. Furthermore, clear and supportive



We conduct safety and compliance assessments, ensuring EV charging stations adhere to established standards, guaranteeing user safety and preventing electrical or fire hazards, as well as specialising in interoperability testing, assessing the seamless communication and charging compatibility between different EV models and charging stations.



regulations can encourage investment in charging infrastructure and provide a stable environment for industry players. This includes incentives such as tax rebates, reduced import duties and other financial incentives for both EV and EVCS deployment.

As EV adoption rises, addressing grid capacity becomes crucial to accommodate increased electricity demand. Implementing smart grid solutions and demand management strategies is essential for optimising grid usage and preventing overloads. Additionally, promoting education and awareness is key to informing the public about the benefits of EVs and the availability of charging infrastructure, dispelling myths and driving consumer interest. Ensuring the interoperability of EVCSs and providing easy access through standardised payment methods, such as mobile apps and credit cards, simplify the user experience and encourage broader adoption.

Environmental considerations need to be taken into account as well. For example, providing incentives for clean energy adoption can be beneficial, explained Muhamad Kamal. “Given the importance of EVs in reducing greenhouse gas emissions and addressing environmental concerns, continued investments and policy support are likely to play a pivotal role in shaping Malaysia’s EVCS future,” he said, subsequently highlighting how maintenance and monitoring of the EVCSs are essential to ensure operational reliability and prevent downtime.

EMPOWERING EVCSs

SIRIM QAS International offers comprehensive testing and certification services for EVCSs. Its capabilities include product testing and evaluation of the performance, safety and compliance of EV charging equipment according to national and international standards. Upon successful testing, SIRIM QAS International provides certification services, offering evidence of compliance with safety and quality standards.



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“We conduct safety and compliance assessments, ensuring EV charging stations adhere to established standards, guaranteeing user safety and preventing electrical or fire hazards, as well as specialising in interoperability testing, assessing the seamless communication and charging compatibility between different EV models and charging stations,” elaborated Muhamad Kamal.

SIRIM QAS International’s offerings benefit all layers of stakeholders, such as:

- ◆ **Manufacturers:** ensuring safety, performance and interoperability standards
- ◆ **Regulatory bodies and government agencies:** setting and enforcing standards for EV charging infrastructure
- ◆ **Utilities and infrastructure providers:** involved in constructing and managing charging networks
- ◆ **Automakers:** providing compatibility assurance for their EVs
- ◆ **Consumers:** benefiting from safe and compliant charging stations

RIGOROUS PROCESS

SIRIM QAS International’s testing and certification process for EVCSs involves several key steps to ensure safety, performance and compliance. Firstly, manufacturers initiate the process by preparing documentation, including technical specifications and schematics, which undergoes rigorous review.

A detailed testing plan is developed collaboratively, including electrical safety tests evaluating the charging equipment’s safety features to prevent electrical hazards.

Next, if the charging station incorporates communication features, interoperability testing ensures effective interaction with various EV models. Environmental and durability tests evaluate its performance under diverse conditions, while electromagnetic compatibility (EMC) testing checks for interference that could disrupt other electronic devices or compromise the safety of the charging equipment. There are also safety compliance assessments that evaluate safety features such as fault protection and emergency shutdown mechanisms.

Finally, results are analysed and, upon successful completion, a test report is issued for certification. Ongoing compliance is ensured through regular surveillance and annual renewals, with certified equipment marked with SIRIM labels and markings.

“SIRIM QAS International’s testing and certification services play a pivotal role in enhancing the overall EV industry by promoting safety, quality and compliance. These services benefit consumers by offering peace of mind and access to reliable charging infrastructure. Ultimately, certification contributes to the sustainable growth and acceptance of EVs and charging systems,” said Muhamad Kamal.

“While the response to the EVCS has been quite encouraging, the industry is presently adopting a cautious ‘wait-and-see’ approach, anticipating guidance and directives from the government before making any decisive moves,” reflected Muhamad Kamal. “This stance underscores the sector’s readiness to align with government policies and regulations, ensuring a harmonious and successful integration of EVCS into the broader ecosystem.”

While certification for EVCSs is relatively recent, SIRIM QAS International’s success stories from other certification schemes, such as the IECCE CB scheme, IECEx scheme and Product Certification scheme, set a positive example for EVCS certification.

“We target at least 10 clients annually, employing an outreach strategy that includes direct marketing, participation in industry conferences and exhibitions, maintaining an online presence and industry-specific forums, as well as collaborating with key industry players,” shared Muhamad Kamal.

Establishing a successful and thriving EVCS ecosystem requires careful planning and tactical investment, including the strategic placement of charging stations, provision of a variety of charging levels, regular maintenance, competitive pricing, multiple payment options and integration with renewable energy.

“By addressing these factors, we can create a successful and sustainable EVCS infrastructure that supports the growth of EVs and meets the needs of both current and future EV owners,” Muhamad Kamal concluded.



SIRIM QAS INTERNATIONAL'S COMPETITIVE EDGE

- >> Accredited testing & certification body that is internationally recognised
- >> Highly skilled and experienced experts on EVCS technology & standards
- >> Comprehensive services under one roof
- >> Timely and efficient service
- >> Quality assurance to meet the highest safety & performance standards

For more information, kindly contact:

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