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Environmental Social Governance

Picture courtesy of Chin Fong Yin



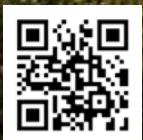
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THE INGENIEUR MAGAZINE IS FULLY ONLINE



THE INGENIEUR is fully online starting from Volume 96, October-December 2023 issue. This initiative is part of BEM's plan to move all its services to be fully online and as part of its efforts towards reducing carbon emissions. Nevertheless, BEM will print 400 hard copies only for PE & PEPC who still wish to receive the print magazine on first come first serve basis. However, they are required to pay postage cost of RM5.00/issue (RM20.00 for 4 issues). Please apply to receive the hard copy of THE INGENIEUR magazine through:

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Registration of Road Safety Auditor (RSA)

Pursuant to the Board's decision on 6th June 2023, the registration of Road Safety Auditor (RSA) will be placed under the purview of BEM with effect from 1st August 2023. All existing RSA registered with Jabatan Kerja Raya (JKR) prior to this date will be offered to be transferred to BEM's Register as their saving rights. This saving rights will expire by 31st December 2023.

All new applications to be registered as RSA will henceforth required to be submitted to BEM.

For further details please contact: pe@bem.org.my





Environmental, Social, Governance

Environmental, Social, Governance or ESG is no more a buzzword but rather a requirement for relevancy and sustainability in the new business environment.

The Ministry of International Trade and Investment or MITI launched the *National Industry Environmental, Social and Governance Framework* (i-ESG Framework) in October 2023. Its objective is to accelerate the transition towards sustainable practices among manufacturing companies, with four key pillars - standards, financing, capacity building, and market mechanisms - supported by 17 strategies, 50 deliverables, and six key enablers. Meanwhile, Bursa Malaysia also unveiled the Bursa Malaysia *ESG Reporting Platform* in 2023 for listed companies.

The above messages are clear signals for the engineering fraternities and the Engineering Consultancy Practices (ECP) to embark on ESG early to gain an early foothold on this new trend to stay relevant. It is even more important for those involved in the manufacturing and construction industries with the increasing global pressure and drive to adopt ESG in their practices.

ESG as the driving force may be usually associated with financial sectors, policy makers and social activists; the call for ESG resonates in

the engineering industry in adopting it. The article on *ESG in the Engineering Realm- Malaysian Perspective with Global Significance* provides an insight into the three ESG pillars of environment, social and governance which are intricately woven into the fabric of engineering. In particular, it emphasises the environmental nexus covering optimised resource utilisation, energy efficiency, waste management and pollution treatment.

The delicate balance between operation and maintenance of Large Scale Solar (LSS) farm which are faced with the nuisance of bird droppings by studying and analysing the behaviour of the birds and working in collaboration with avian NGO for solutions reflects the spirit of SDG Goal 17. The painstaking process and solutions are well documented in the article by TNB Renewables on *Energy Sector's Significant Strides in achieving SDGs*.

Taking cognisance of the emphasis on ESG in the newly launched New Industrial Master Plan 2030 (NIMP 2030), I urge all engineering fraternities to start the journey early in this respect to stay ahead in the engineering industry.

Datuk Ir. Ahmad Redza bin Ghulam Rasool
President, BEM



CALL FOR ARTICLES

The Ingenieur is published quarterly by the Board of Engineers Malaysia. The following are the themes for the coming issues.

- Vol. 98 April-June 2024
Engineering & Law
- Vol. 99 July-Sept 2024
Agriculture Engineering
- Vol. 100 Oct-Dec 2024
VOLUME 100 - The Centennial

Articles and other contributions relevant to the themes are welcomed, but the decision to publish rests with the Editorial Board.

Advertising inquiries are also welcomed. Please refer to the BEM advertisement on Page 41 for the latest rate card and booking form.

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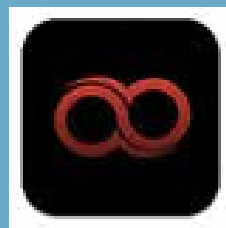


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October-December 2023*



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January-March 2024*

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Ainil Asyikin – Multi-Perspective Engineer

Kelantan-born Ainil Asyikin exhibits keen intellect, inner drive and positive attitude. She took the limelight in 2022 when she graduated from Princeton University with a BSc in Mechanical and Aerospace Engineering. On top of this, the young engineer won an award for undergraduate research in defect detection. She sees engineering as interesting science where she can be creative with both hardware and software. In an online interview from New York with *The Ingenieur*, Ainil comes across as a well-rounded, confident and enterprising engineer.

Ainil says she has a natural inclination to find out how things work. Her interest in machinery and working moving parts started early. Her father, an engineer, exposed her to tools and mechanical parts from young. She is fortunate that both parents were supportive and encouraged her to find solutions to achieve what she wants.

Her academic excellence shone in secondary school. At the MARA Junior College of Science in Pengkalan Chepa, Kelantan, she scored 9A+ in the SPM. This led her to a scholarship to take up the pre-U International Baccalaureate (IB) diploma in New Mexico, US. Ainil notes that the two-year IB diploma course was very stimulating as the subjects were inter-disciplinary and global-focused. “We learn History of the World, World Wars, Sciences, Arts,” she elaborates. It opened her mind to multi disciplines in her pursuit of knowledge. Her research skills were also honed in one of the IB programmes called Extended Essay.

Her good results paved the way to enter the prestigious Princeton University. The Ivy League university is one of the world’s foremost research universities. It enrolls about 1,500 students a year and the acceptance rate for international students is reported to be only 6%. How is it like to study in an Ivy League institution? Ainil reveals that it is highly competitive because of well-heeled



Ainil Asyikin

students. For instance, many of her peers have vast learning resources. “They could have already mastered Coding level 10 while you have to start from scratch,” she illustrates. Adopting the right attitude, Ainil acknowledged the circumstances and told herself not to compare herself with others.

On the other hand, she finds that Princeton University opens doors to the ‘real world’ as students get to hear from prominent speakers from renowned corporations like Tesla and Nasa. “We are not in a bubble setup; it helps to hear people from industry, how they grapple in the real world.” After graduation, she acknowledges that the Princeton name has a lot of alumni and

networking value.

Studying in a foreign country, Ainil shares that she had a fair share of communication issues. Early on, the differences between American and Malaysian communication styles put her in a spot. She resorted to asking and observing others. It took some time for her to make people understand what she was trying to put across. “I asked a lot and observed others on how they explain complex ideas by breaking them down into simple terms,” she reveals. Eventually, she picked up skills on intellectual conversations, argument and analysis.

Why did she choose to study Mechanical Engineering? She sees Mechanical Engineering as a foundation of a lot of engineering or what she terms as the ‘build right function’. She does not see engineering as ‘cut and dry’ but an exciting science which you can apply and do fun things. At Princeton, she says she enjoyed her projects studying trains, rockets and robots. She sharpened her interest in engineering by learning both hardware and software, enjoying the creative use of Artificial Intelligence (AI), robotics and data analysis.

“You must not be microscopic in engineering,” she declares, “but be more comprehensive and zoom out when trying to solve problems.” This was the principle she applied while doing her undergraduate research. Ainil says her thinking cap covers many perspectives — engineering, maintenance, design and industrial production. Her research project evolved around how to detect and solve defects in production without stopping machines. The findings in *Automated Defect Detection: An end-to-end Pipeline From Data to Deployment* earned her the Donald Janssen Dike Award for Excellence in Undergraduate Research. Following this, she was nominated to be a member of Sigma Xi, a scientific research honour society founded in 1886. Sigma Xi chapters are found at many colleges and universities, Government laboratories and industry research centres around the world. More than 200 Nobel Prize winners have been Sigma Xi members.

Besides mechanical and aerospace engineering, the pragmatic Ainil took a minor in Entrepreneurship in her degree. This secondary specialisation augurs well for the young engineer. “It comes hand in hand, knowing how to make things that people want to buy, how to make it affordable, saleable and scalable,” she explains.



Ainil and her family at her graduation in Princeton

Ainil's present job is with Palantir Technologies, a public-listed American company based in New York. She is involved in various aspects of the telecommunications sector such as network, technology and finance. On why she did not work in the aerospace industry, she explains that there are few opportunities for foreigners due to stringent US security clearances.

After work, Ainil unwinds with hobbies like reading, running and dancing. She is an avid reader. “I love to read, fiction and non-fiction. I can distil content to a few main points,” she remarks. Continuously improving herself, she has joined a Design Thinking Society to learn about innovation and transformation.

For the future, she has set her sights on a higher goal. She plans to obtain a Master's degree in Public Policy and do some policy work. Her rationale is that many society problems can only be solved with the right public policies.

On her advice for aspiring engineers, she calls on them to be their own agent of change. They should decide on the incremental habits that will improve themselves and these habits will lead to a brighter future. “While you are still young and exploring your reality, be open to consuming the opportunities around you. Grow curious, fix your relationship with learning, and never put a glass ceiling for yourself in a world already full of adversities. Your only limit is the one that you impose on yourself.” - *Inforeach*

ESG in the Engineering Realm – Malaysian Perspective with Global Significance

By **Dr Nik Meriam Nik Sulaiman**
Honorary Professor, Universiti Malaya.

Ts. Raja Shazrin Shah bin Raja Ehsan Shah
Managing Director, Galaxy Tech Solutions (KL) Sdn Bhd

In this inter-connected age, ESG, encapsulating Environmental, Social, and Governance elements, has emerged as an indomitable force guiding organisational operations and strategies across the globe (refer to Figure 1). This powerful triad, while usually associated with financial sectors, policymakers, and social activists, is no longer confined to these domains. The clarion call of ESG resonates profoundly in the world of

engineering, requiring these key builders of society to embrace and adopt these principles.

Defining the ESG Pillars

Environmental: This segment is the guardian of our planet, addressing everything from urgent climate change issues and carbon footprint



Figure 1: Regulations on ESG in selected countries.

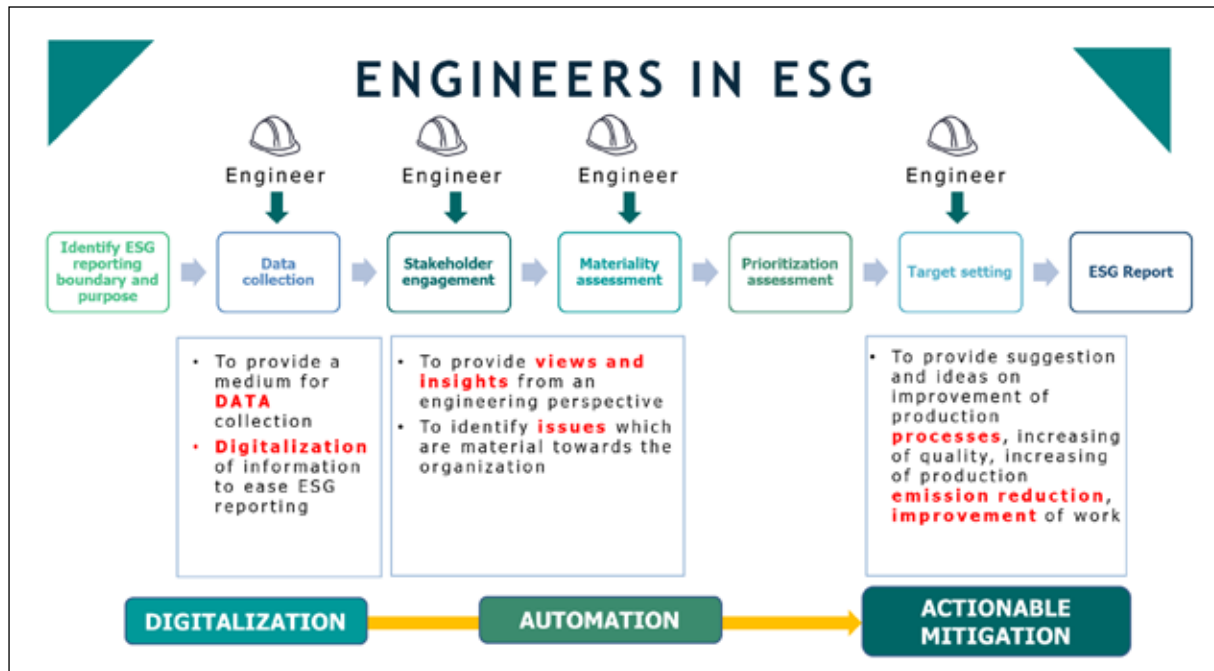


Figure 2: The role of engineers in ESG.

reduction to efficient resource utilisation and management of residuals, whether in the air, water, or land. The overarching goal is clear: our current actions must not jeopardise the Earth's future ecological balance.

Social: This pillar is humanity's advocate. It underscores the importance of safeguarding the rights, health, and well-being of all stakeholders, whether it is the conditions for factory workers, the impact on residents near major infrastructural projects, or the end-users of a particular innovation. The emphasis is on fostering vibrant communities culminating in universal value creation.

Governance: A silent but steadfast pillar, governance focuses on the ethical frameworks guiding organisational decision-making. It champions transparency, ethics, and accountability, ensuring that operations are equitable and mutually beneficial.

Engineering and ESG: An Inextricable Bond

Why, one might ask, should engineers, traditionally associated with design efficiency, structural integrity, and safety, pivot towards

ESG? The answer lies in the engineers' vital role as the architects of tomorrow's development on a scale ranging from nano-size to the obvious, influencing everything from micro-electronic components to expansive infrastructure projects, including those helmed by Malaysian giants like Petronas, Sime Darby, and TNB, to name a few. The choices engineers make in design, material selection, methodologies, and technologies cast long shadows on the environment, society, and the ethical fabric of all projects. One should also include the impacts of projects that involve the service sector, such as handling of gaseous emissions, wastewater, and solid wastes.

For engineers, especially those influencing decisions in large entities, integrating ESG is no longer a mere option—it is an imperative. It is not just about constructing the next skyscraper or designing the next tech innovation; it is about ensuring that these creations resonate with sustainability, inclusivity, and ethical considerations (refer to Figure 2).

While ESG might seem like a modern catchphrase for now, it actually symbolises timeless concerns: holistic, sustainable, and ethical considerations. For engineers in Malaysia and within the larger ASEAN canvas, this means an evolution in thought, a widening of horizons, and

a dedication to crafting solutions that transcend mere functionality to embody sustainability, inclusivity, and ethical integrity.

ESG Processes: The Engineering Intersection

The pillars of ESG are intricately woven into the fabric of engineering. As we embark on this exploration of their intersection, it becomes evident that engineering processes extend beyond constructing or creating; they inherently influence and are influenced by the broader tenets of sustainability encapsulated within ESG.

THE ENVIRONMENTAL NEXUS

The environment is not just a backdrop but a principal character in the narrative of engineering. Its preservation, conservation, and sustainable utilisation of nature's resources lie at the core of engineering decisions in determining the environmental footprint of their projects. Here is how this unfolds in specific areas:

Resource Utilisation: Engineers are the final arbiters when it comes to selecting materials. This decision extends to not just picking those that fit the purpose, but also ensuring that their sourcing is sustainable and that they can be recycled or upcycled, and circularity is considered early in the project. For example, in urban infrastructure projects, opting for green construction methods and sustainable materials is no longer an exception but increasingly the norm.

Environmental Impact Assessments (EIA): Before major projects see the light of day, a detailed EIA becomes inevitable. Engineers, alongside environmental specialists, assess potential impacts and provide mitigation strategies, ensuring projects do not leave undesirable consequences on the environment. An EIA exercise involves a comprehensive evaluation that can dictate the trajectory of projects.

Energy Efficiency: Engineers today are leveraging cutting-edge technology to craft systems that are not only functional but also optimise energy use. Whether it's designing energy-efficient buildings that conform to green building standards or devising power grids equipped with smart technology to curtail energy losses, efficiency is the watchword.

Waste Management and Industrial Effluent

Treatment: Residues, more commonly termed wastes, are the inevitable by-products of human civilisation but their management need not be a detriment to the environment. Engineers are pioneering solutions to minimise waste generation at the source, champion recycling initiatives, and ensure safe and environmentally-friendly waste disposal. A critical area here is the management of industrial effluent. Effective treatment systems are being engineered to ensure that industrial wastewater is treated to meet stringent regulatory standards before release, safeguarding aquatic ecosystems and preventing groundwater contamination. Similar considerations should be developed to cater to the management of emissions into the atmosphere while solid waste management provides more fertile opportunities for innovations using green technology-based solutions. Increasingly, future innovations and research should take inspiration from nature for solutions.

THE SOCIAL LINK

Engineers are also responsible for shaping the social landscape. Their creations directly impact communities and can either foster or hinder social development.

Safety and Well-being: From ensuring robust and safe infrastructure to developing technologies that improve quality of life, engineering solutions directly affect societal well-being.

Inclusivity: It is within the realm of engineers to develop inclusive designs that cater to all sections of society, be it accessible public transportation systems or technology solutions that bridge digital divides.

Community Impact: Major projects, especially infrastructural ones, can reshape communities. Engineers have a responsibility to foresee, mitigate, and communicate potential disruptions or benefits to these communities.

GOVERNANCE AND ENGINEERS

While governance is often viewed through the prism of boardroom decisions, it also permeates engineering in various ways:

Ethical Decision Making: Engineers face numerous decisions where ethics come into play. It could be choosing between cost-effective materials versus sustainable ones or addressing

potential design flaws that might have safety implications.

Transparency: In this age of information explosion, stakeholders demand clarity and integrity of information made available to them. Engineers, thus, need to ensure they communicate designs, impacts, risks, and benefits transparently.

Accountability: Engineering is a discipline where mistakes can have significant repercussions. Governance in engineering emphasises responsibility, ensuring designs and implementations adhere to the highest standards.

Malaysia and ASEAN in the ESG Engineering Context

In the Malaysian and the broader ASEAN scenarios, where rapid industrialisation and urbanisation are juxtaposed with rich biodiversity and cultural diversity, the role of engineers in shaping sustainable futures becomes even more critical. The Petronas Twin Towers, an architectural marvel, not only showcases engineering prowess but also embodies advanced energy and environmental design principles. Similarly, Malaysia's LRT and MRT systems, while being feats of engineering, also cater to the larger societal goals of reduced traffic congestion, lower emissions, and enhanced public transport accessibility.

In essence, ESG is not a parallel track running alongside the engineering journey; rather it is the same track on which the journey is set. It is the lens through which modern engineering must be viewed, ensuring that every brick laid, every circuit designed, and every system implemented is aligned with the broader vision of a sustainable future for all stakeholders leading to a better quality of life.

Recognising the Gaps: Opportunities for Engineers in ESG

The realm of ESG is vast, and while many companies and sectors have made strides in integrating its principles, there are still pronounced gaps that should be addressed. Recognising these gaps goes beyond pinpointing shortcomings but also uncovering opportunities where engineers can lead and innovate. Here, we will delve into

these gaps, contextualising them within the Malaysian and wider ASEAN frame, and explore the potential avenues for engineers.

RAPID URBANISATION & SUSTAINABLE INFRASTRUCTURE

Malaysia, like much of other ASEAN member nations, is witnessing rapid urbanisation. Cities like those within Wilayah Persekutuan (Kuala Lumpur), Selangor, Johor and Penang are expanding at unprecedented rates. While this growth presents numerous opportunities, it also poses challenges in terms of sustainable infrastructure. The gap here is in creating sustainable urban environments that are resilient, green, and inclusive for its urban population.

Engineers can pioneer designs that optimise energy consumption, minimise waste, and incorporate green spaces. Adopting rainwater harvesting in high-rises, using solar devices and designing urban transport are some doable choices which should be made mainstream at affordable prices.

INCREASING ENVIRONMENTAL THREATS

The region faces escalating environmental threats from both natural and anthropogenic causes, resulting in the escalation of disasters such as floods, landslides and biodiversity losses in both land and marine sectors.

Engineers have the expertise to design systems to cater for disaster-related events. Under normal conditions, there are numerous needs for better machinery and processes that can be developed to reduce impacts and conserve the environment. Sustainable logging machinery that reduces tree wastage or innovative irrigation systems that optimise water use for agriculture are some prime examples.

SUPPLY CHAIN COMPLEXITIES

Big companies like Sime Darby and Petronas have vast and intricate supply chains. Ensuring sustainability throughout these chains, especially when dealing with suppliers from diverse geographies and regulatory environments, is challenging. At the same time, there is a need to help the SMEs as they form a vital part of the supply chain.

Engineers can develop monitoring and analytical tools that track the sustainability

metrics of various supply chain components, ensuring that suppliers adhere to the company's ESG benchmarks.

TECHNOLOGICAL ADVANCEMENTS & SUSTAINABILITY

With the advent of Industry 4.0, there is an explosion of technological possibilities, from AI to IoT. There is a dire need to leverage these for ESG purposes. As immediate examples, engineers, with their grasp of technology, can lead in integrating AI for energy management or using IoT for real-time monitoring of industrial emissions.

REGULATORY DIVERGENCE

ASEAN, with its diverse member states, often has divergences in environmental and social regulations. What is permissible in one country might be frowned upon in another.

Engineers, especially those working on transnational projects, can standardise operations to the highest ESG standards, ensuring that projects not only meet but exceed local regulatory mandates.

RESKILLING & UPSKILLING CHALLENGES

As industries shift towards more sustainable operations, there is a pronounced skill gap to meet the demands of an organisation's sustainability programme. Existing workforces, including engineers, often find themselves needing to upskill and re-skill in this area.

Engineers can lead in developing training modules, courses, and workshops focusing on the integration of ESG in various industrial processes.

The gaps in the current ESG landscape are not mere challenges; they are opportunities waiting to be harnessed. Engineers, with their unique blend of technical prowess and problem-solving capabilities, are positioned to not just fill these gaps but to innovate, setting new industry standards and shaping a more sustainable ecosystem at national and regional levels.

Cultivating Green Talent: Confluence of the ESG Framework and Engineering Education

The intersection of engineering and ESG is undeniable. Yet, this merger extends beyond

professional practices in the field and is rooted deeply in the education and training of future engineers. Malaysia, with its recent introduction of the i-ESG framework, has not only provided a structured path for industries but has underscored the importance of embedding these principles right from the grassroots, namely our educational institutions.

THE CURRENT EDUCATIONAL LANDSCAPE

Traditionally, engineering education in Malaysia is focused predominantly on technical competencies. While these are undeniably vital, there is a growing realisation of the importance of sustainability in the curriculum. However, the integration of sustainability into many technical-based curricula has been gradual, with many institutions still in the infancy stages of this inclusion.

WHY SUSTAINABILITY IN ENGINEERING CURRICULA IS NON-NEGOTIABLE

With Bursa Malaysia's Third Reporting Guideline, Securities Commission Malaysia's Simplified ESG Disclosure Guideline, and the launch of the i-ESG framework by the Ministry of Investment, Trade and Industry, the message is clear: sustainability is no longer a choice; it is an imperative. Engineers, as the backbone of industrial and infrastructural development, play a pivotal role in actualising Malaysia's green goals. This responsibility begins not on the job but in the classroom. By embedding ESG principles into engineering curricula, we ensure that our future engineers do not just view sustainability as an add-on but as an integral part of their profession.

The i-ESG framework further augments this movement. With initiatives like i-ESGReady and i-ESGStart, there is a clear roadmap for institutions to incorporate sustainability into their courses, ensuring that their graduates are not just industry-ready but future-ready.

THE CONTINUOUS LEARNING CURVE

Sustainability, given its evolving nature, is not a one-time lesson but a continuous learning curve. Practising engineers need to remain updated on the latest ESG practices. Professional bodies, in tandem with the Government, can facilitate this through workshops, seminars, and certifications, ensuring that our engineers remain at the forefront of sustainable innovation.

The Engineer's Role in Shaping the ESG Landscape

Navigating the complexities of the 21ST century, the harmonisation of engineering with ESG stands out not as an option but as an intrinsic necessity. It is evident that the role of today's engineer stretches beyond mere technical constructs, but seamlessly extends into environmental conservation, societal welfare, and transparent governance.

Engineers occupy a pivotal juncture: the nexus where ideas metamorphose into reality and where visions manifest as tangible outcomes. From this unique vantage point, they have an unmatched potential to sculpt projects and industries in a manner that imprints sustainability onto the very fabric of our built environment. Engineers now must internalise these ESG principles, making them an inherent part of their professional DNA.

In this evolving narrative, Malaysia and the wider ASEAN region have a story to write, one that is rich with opportunity and innovation. As this region's dynamism continues, the appetite for sustainable infrastructure and technology will burgeon. With engineers who are attuned to the ESG ethos, ASEAN is not merely on the cusp of change but has the potential to script a new chapter in global sustainability.

Concluding Remarks

Engineers stand on the precipice of a paradigm shift, armed with the tools and knowledge to mould a sustainable future. It is more than just a role; it is a deep responsibility. In their decisions lie the echoes of a future yet to unfold: will it be one of missed opportunities or visionary transformation? The answer begins with the choices made today. ■

TAKE A FRESH LOOK AT SEWAGE TREATMENT PLANT

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RENOLUX ENGINEERING SDN. BHD.
26 & 26A, Jalan Kebudayaan 18, Taman Universiti, 81300 Skudai, Johor DT

 renoluxesb@gmail.com

 +607 – 520 4577

 Ir Hj Saniman B Mail +6012 – 289 6369
Muhammad Amin B Saniman +6014 – 911 0483
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Energy Sector - Significant Strides In Achieving SDGs

By Ir. Ts. Dr Wan Syakirah Dato' Wan Abdullah
Head of Business Development, TNB Renewables

Muhammad Nazry Chik
Head of Asset Management, TNB Renewables

Curie Navita Santhira Mogan
University College London

The Sustainable Development Goals (SDGs) established by the United Nations in 2015 serve as a global framework to address the 17 pressing issues affecting people and the environment. These goals cover a wide range of issues, including affordable and clean energy (Goal 7), climate action (Goal 13) and the protection of life on land (Goal 15). Through dedicated efforts and the widespread adoption of sustainable practices within the Energy Sector, we can strive to preserve biodiversity whilst accelerating the move towards accessible green energy and decarbonisation. These efforts promise a future teeming with biodiversity, and the survival of species like the Gastric Brooding Frog. This article explores the efforts of the energy sector in achieving the SDGs and emphasises the importance of preserving biodiversity and protecting wildlife habitats, aligning particularly with SDG Goal 15: Life on Land.

Malaysia's energy sector has made remarkable strides in the pursuit of Goals 7 and 13. Currently, 23% of Malaysia's energy mix is derived from renewable sources, notably hydropower generation [1]. Moreover, the country is on track to reach an impressive 31% contribution from renewables by 2025. Companies such as Tenaga Nasional Berhad (TNB) have demonstrated an unwavering commitment to bolstering Solar Energy production, capitalising on Malaysia's advantageous equatorial location. Benefiting from solar irradiance ranging from 1575 to 1812 kWh/m² yearly [1], Malaysia continues to harness its natural resources effectively in its quest for

sustainable energy solutions. As we strive towards a greener future through the advancement of large-scale solar plants, biomass plants, and hydroelectric plants, we must contemplate their potential impact on the delicate ecosystem and devise sustainable solutions to mitigate any disruptions they may pose.

Through the establishment of TNB Renewables Sdn Bhd (TRe), TNB aims to grow renewable energy in the local market through the development of Large-Scale Solar (LSS) farms, capable of generating more than 30MW of power [2]. At present, Malaysia has only a 2% renewable energy penetration, mainly contributed by solar [2]. As TRe strives to expand its reliance on solar energy, a significant challenge arises in balancing the uninterrupted supply of energy with the preservation of ecosystems and wildlife.

TNB Sepang Solar

TNB Sepang Solar (TSS) is a remarkable achievement for TNB as it actively supports Malaysia's pursuit of sustainable energy while upholding Goal 15. This ground-mounted solar PV park, owned entirely by TNB Renewables, boasts an impressive capacity of 50MW. Covering an expansive area of 98 hectares and featuring over 230,000 solar panels, the development of TSS represents a significant leap towards a greener future. One notable aspect of TSS is its strategic location amidst a vast palm oil plantation. This positioning has allowed the solar plant to be

established without causing substantial disruption to the natural habitat and wildlife in the area, including bird populations. By carefully considering the ecological impact, TSS sets a positive example for harmonising renewable energy expansion with environmental preservation. Moreover, the accessibility of TSS adds to its significance. Situated only one hour away from the capital city, Kuala Lumpur, and approximately half an hour from Kuala Lumpur International Airport, the solar farm is easily accessible for visitors and investors who wish to observe its operations firsthand. This proximity facilitates convenient viewing opportunities, promoting awareness and interest in sustainable energy initiatives.

In addition to the strategic positioning of TSS, TNB Renewables understood that the selected area had no existing bird populations. This knowledge guided their careful site selection process, ensuring minimal ecological disturbance. However, approximately two years ago, TSS started to notice an increase in bird activity at the site, likely due to the presence of food sources near the detention pond and the peaceful environment. While this indicates the potential for a thriving habitat, it also poses challenges for the solar energy systems implemented. Bird droppings can obstruct sunlight, leading to a reduction in panel performance by approximately 7.4% [3]. Additionally, these droppings may contain uric acid that could potentially damage the solar cells. As TSS strives for decarbonisation and sustainable energy solutions, it becomes crucial to explore strategies that will effectively address the impact of bird droppings on solar panels while ensuring the preservation of bird populations.

Fortunately, bird droppings are currently not a concern at TSS. However, it is essential to acknowledge that this situation may change over time. TNB Renewables has taken proactive measures to comprehend the local ecology and bird species inhabiting the area to ensure improved management of future solar projects and address potential challenges. This understanding equips them with the necessary knowledge to develop viable solutions that strike a balance between mitigating bird droppings' effects and preserving avian populations. Prioritising both clean energy goals and ecological considerations, TNB

Renewables aims to pave the way for sustainable solar energy expansion.

Collaboration with SARANG

In a collaborative effort with SARANG, an NGO, an extensive three-month study was undertaken to identify and document the diverse bird species inhabiting the area surrounding TSS. This collaboration with seasoned professionals, who have dedicated years to studying avian life, reflects the spirit of SDG Goal 17: Partnerships for the Goals. This partnership demonstrates the power of collective action and collaboration in addressing environmental challenges. This collaborative effort also aligned with SDG Goal 15 as it provided invaluable insights and a comprehensive understanding of the wildlife species present within the vicinity of TSS.

Migratory and Resident Bird Species

A total of 28 bird species were observed in the vicinity of TSS, comprising three migratory species and 25 resident species, each with its own significance and conservation status. Examples of these birds are listed in Table 1.

These birds play important roles in maintaining the balance of local ecosystems. For example, the Spotted Dove and Zebra Dove play a vital role in seed dispersal as they feed on various fruits and disperse the seeds through their droppings, whereas the Black-winged Kite and Brahminy Kite act as predators, controlling rodent populations. The Lesser Coucal, Eurasian Tree Sparrow and Pacific Swallow help maintain the balance of the local ecosystem by consuming insects. As for the migratory birds, their migratory patterns allow them to access optimal breeding sites, find ample food sources, and avoid unfavourable weather conditions, ultimately ensuring their survival and successful reproduction. Recognising their importance on the overall health and resilience of the ecosystem and understanding their conservation status is crucial for implementing effective measures to protect and sustain these valuable ecosystems for future generations.

Resident Species	Migratory Species
1. Chinese Pond Heron 2. Black-winged Kite 3. Brahminy Kite 4. Eurasian Tree Sparrow 5. Barn Swallow 6. Pacific Swallow 7. Zebra Dove 8. Spotted Dove 9. Lesser Coucal	1. Pheasant Tailed Jacana 2. Lesser Whistling Duck 3. Long Tailed Shrike

Table 1: Migratory and resident bird species found in TNB Sepang Solar plant

The birds at TSS provide not only ecological services but also recreational and aesthetic value to visitors, particularly birdwatchers. By showcasing the beauty and diversity of these avian species, TSS has the potential to become a hub for observing and learning about local birds, fostering curiosity, and inspiring further exploration and education about clean energy practices. This engagement with the captivating birds at TSS enhances the visitor experience and catalyses raising awareness and mobilising more individuals to actively support the achievement of the Sustainable Development Goals, thus propelling progress towards a sustainable future.

The three-month study conducted to document bird species at TSS was an important endeavour to understand the local avian biodiversity. However, it is essential to note that the study primarily focused on identifying and documenting bird species rather than quantifying their specific impact on ecosystem balance. Consequently, information regarding the number of seeds dispersed by the birds or the extent to which they control insect or rodent populations was not determined. While the study provided invaluable insights into the diverse bird species present at TSS, further research and studies would be necessary to quantitatively assess the precise contributions of these bird populations to the ecosystem's overall balance.

One significant outcome of this collaboration was the debunking of a prevailing myth that birds are attracted to solar panels due to their resemblance to water, causing them to dive into the panels. Contrary to popular belief, SARANG's expertise revealed that birds are much smarter than to mistake solar panels for water. This revelation opens new avenues for research at TNB Renewables because it allows them to shift their focus towards exploring the actual factors that influence bird interactions with solar installations, such as the physical characteristics of the solar farm or any environmental factors. In addition, SARANG also shed light on the habitat preferences of local bird species. For example, the observation that owls did not utilise the previously installed birdhouse revealed the importance of providing a variety of nesting options. This new understanding paves the way for an improved biological approach to rodent populations within the solar farm, as well as contributing to bird conservation strategies which would cater to the diverse needs of the local bird populations.

Given the uncertainties surrounding the potential impact of purposely creating a conducive environment, particularly in light of a previous instance where an abundance of sparrows negatively affected transformer operation at another TNB site, a cautious



Chinese pond heron, one of the resident species in TNB Sepang Solar plant

approach is warranted. A thorough evaluation of the advantages and disadvantages of establishing such environments specifically tailored to TSS' needs should be undertaken. By conducting a comprehensive analysis, accounting for lessons learned from past experiences, and considering appropriate mitigation strategies, we can make informed decisions regarding the establishment of bird habitats that strike a balance between promoting bird populations and safeguarding the smooth operation of our facilities.

Target 15.5 of SDG 15 also highlights the urgency to reduce deforestation, protect natural habitats, and halt biodiversity loss. In line with this goal, TNB Renewables has been actively seeking more efficient solutions, particularly by prioritising the development of large-scale solar plants that occupy a minimal land area. An example of such a plant is TSS, which was established in 2018 and utilises poly-crystalline silicon PV cells with an efficiency of approximately 17% [4]. This choice strikes a balance between cost-effectiveness and efficiency, making it a suitable option for the project. Moreover, TNB Renewables' newer LLS plants, TNB Bukit Selambau Sepang (TBSS) and TNB Bukit Selambau Sepang 2 (TBSS2) take this commitment further by employing mono-crystalline silicon PV cells, which have

a slightly higher efficiency. By adopting these efficient solar technologies, TNB Renewables demonstrates its commitment to improve with each new plant development in both sustainable energy production and the preservation of natural habitats, aligning with the objectives of SDG 15.

Moving forward, it is essential to explore further advancements in solar technology to scale down the land area required for future solar installations. The National Renewable Energy Laboratory (NREL) has made significant progress in fabricating six junction solar cells with an efficiency of almost 50%, suitable for concentrated solar photovoltaics [5]. However, further studies are needed to assess the feasibility of adopting these technologies within the Energy Sector in Malaysia. By continuing to explore and integrate enhanced technologies, Malaysia can continue its journey towards a greener future, further minimising land usage while maximising energy efficiency and conservation efforts in line with SDG 15.

Agrivoltaic Systems

As Malaysia's energy sector expands its portfolio of solar farms, there is an opportunity to explore the implementation of dynamic agrivoltaic

systems, which can maximise the efficient use of land. This initiative not only aligns with SDG Goal 15 to protect biodiversity and ecosystems but also offers additional benefits. According to a simulation study, the water requirement of lettuce was reduced by less than 20% as a result of the effect of panel shading [6]. Furthermore, these systems provide job opportunities to farmers, contributing to SDG Goal 8 by promoting productive employment and work for all. Dynamic agrivoltaic systems have the potential to bring up to a 40% increase in profitability for farmers, providing them with financial benefits [7]. By integrating agriculture and solar energy, Malaysia's energy sector can contribute to sustainable land use and foster economic development in rural communities, concurrently supporting multiple SDGs.

Conclusion

In light of the changing climate and the dynamic nature of local ecology, the energy sector across Malaysia must implement a comprehensive adaptive management programme, taking example from the proactive approach demonstrated by TNB Renewables. TNB Renewables' actions to identify and document the birds sighted within the vicinity exemplify their commitment to equipping themselves with the necessary knowledge for developing feasible solutions. By monitoring and collecting valuable information, including changes in wildlife behaviour, population sizes, and habitat usage patterns, the sector can contribute to the efforts of environmental organisations. Establishing partnerships with local research institutions and environmental organisations would further enhance scientific studies on the long-term effects of solar plants on the local ecology, encompassing ecosystem monitoring, habitat assessment, and overall ecological health. The data obtained from these endeavours would serve as a foundation for adaptive management, showcasing the energy sector's dedication to upholding SDG Goal 15 and its commitment to the preservation of biodiversity and the protection of natural habitats. ■

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Electric Vehicles - Towards a Greener and Sustainable Transportation Network

By Associate Professor Ir. Ts. Dr Wong Shen Yuong
Department of Electrical and Electronics Engineering
Xiamen University Malaysia

As the world progresses toward a low-carbon, and potentially carbon-free, automotive future, electric vehicles (EVs) are gaining prominence as an increasingly appealing, and eventually cost-efficient, means to achieve this objective. The current EV penetration rate, standing at 4% in 2020, is anticipated to surge to 20% by 2025, 50% by 2030, and surpass Internal Combustion Engine Vehicles (ICEVs) in sales from 2035 onward. Figure 1 shows the EV sales worldwide [1].

The race in ASEAN nations in the EV sector is intensifying as countries steadily revise and enhance their EV development strategies. In Malaysia, the adoption of EVs has been gradually gaining attention.

Malaysia has outlined a roadmap with initiatives to support the development and adoption of EVs through the National Automotive Policy (NAP). The “NATIONAL TRANSPORT POLICY: 2019-2030”, released by the Malaysian Ministry of Transport, clearly states the objective of

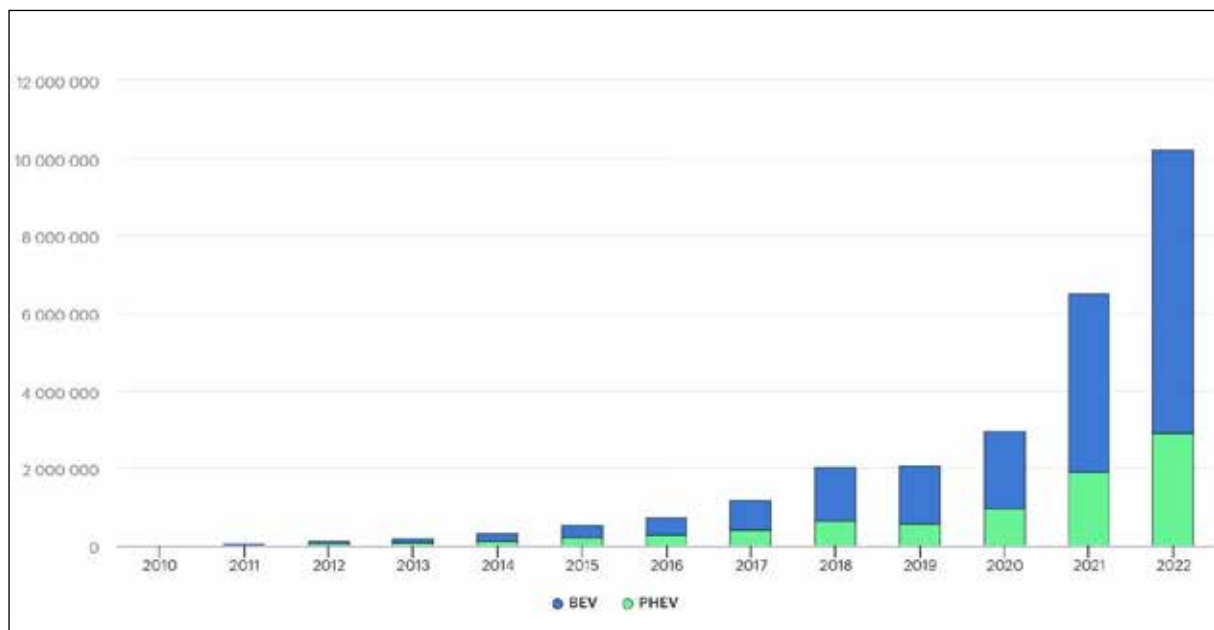


Figure 1: Worldwide Electric Vehicle Sales [1]

harnessing the technological power of Industry 4.0 to create a transportation system [2]. Besides, “LOW CARBON MOBILITY BLUEPRINT: 2021-2030” also highlights GHG emissions and energy reduction via electric vehicle adoption [3]. The “NATIONAL ENERGY TRANSITION ROADMAP” has pinpointed green mobility as a pivotal catalyst for transformation [4]. Electric vehicles are propelling countries toward a more environmentally friendly future, and Malaysia has established the necessary groundwork to implement a low-carbon transportation system.

The Ministry of International Trade and Industry (MITI) has set up the National EV Task Force (NEVTF) to encourage EV adoption, expand the nationwide EV charging infrastructure, and stimulate investments within the EV ecosystem [5]. Additionally, MITI has initiated the National EV Steering Committee (NEVSC) under the umbrella of the NEVTF. This committee is dedicated to accelerating the advancement of Malaysia’s energy-efficient vehicle (EEV) ecosystem. The NEVTF has spearheaded promising advancements, including TNB’s Greenlane project for EV charging stations (EVCS), the formulation of EVCS guidelines by Suruhanjaya Tenaga, the

regulator for the energy sector, and the process for licensing EV charging point operators (CPOs). Furthermore, KPKT, the Ministry of Housing and Local Government, has developed guidelines for EV charging bays.

In Malaysia, the EV market primarily consists of a range of vehicles, including:

- Plug-in Hybrid Electric Vehicles (PHEVs) combine Fuel and Electric Power. PHEVs use both an internal combustion engine and an electric motor powered by a rechargeable battery. Typically, they offer a limited electric-only range before switching to the combustion engine.
- Battery Electric Vehicles (BEVs) are fully electric vehicles. They operate solely on electricity stored in rechargeable batteries, producing zero tailpipe emissions. Different models offer varying ranges per charge, from shorter ranges suitable for city commuting to longer ranges for extended travel.
- Hybrid Electric Vehicles (HEVs) combine Gasoline and Electric Power. HEVs utilise an internal combustion engine and an electric motor, but they cannot be plugged

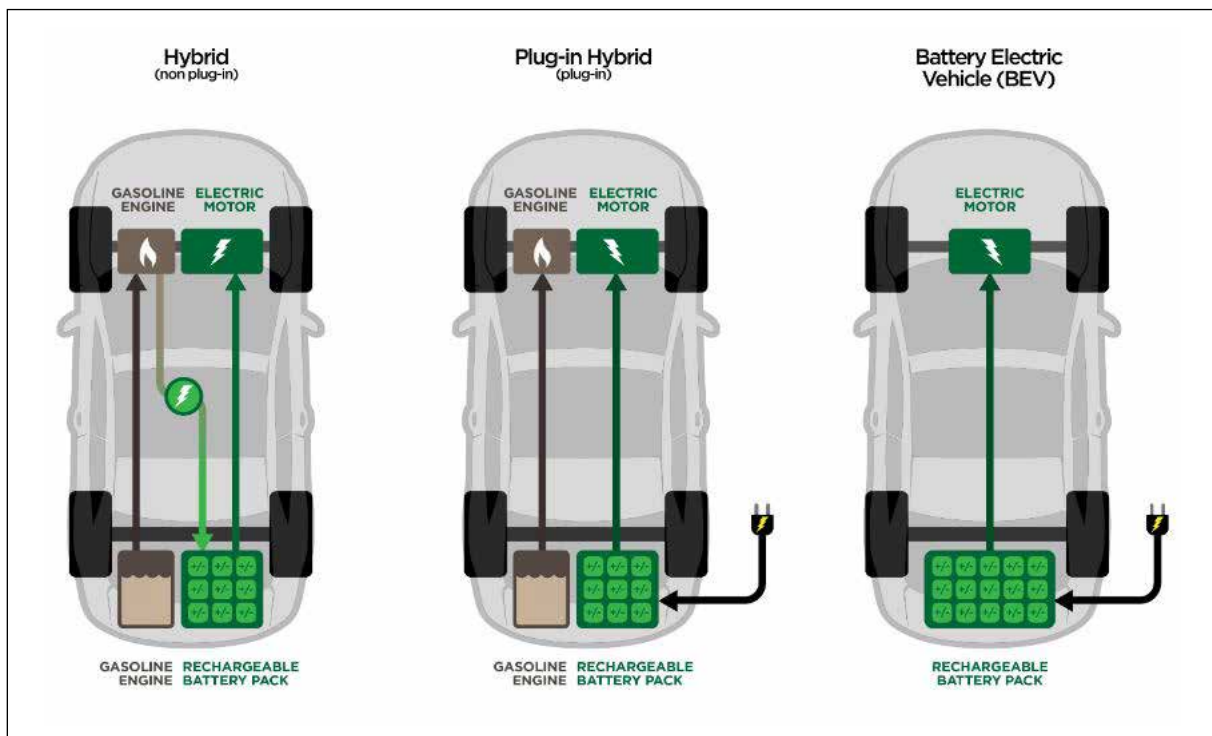


Figure 2: Types of Electric Vehicles

in to recharge. They self-charge via the regenerative braking charging of the battery while driving, enhancing fuel efficiency.

Malaysia has been taking steps to promote EVs with Environmental, Social, and Governance (ESG) aspects in mind.

ENVIRONMENT

The widespread adoption of electric vehicles is primarily driven by their ability to significantly decrease carbon emissions. Unlike internal combustion engine vehicles which are reliant on fossil fuels, electric vehicles operate on electricity, thus minimising direct emissions. The shift from internal combustion engines to electric motors enables the transportation sector to contribute tremendously to meeting Malaysia's ambitious climate objectives, as outlined in global accords like the Paris Agreement. Shifts in fuel preferences are anticipated, reducing the need for petroleum products while boosting electricity demand. These changes are likely to impact the primary energy mix and play a significant role in improving the environmental sustainability of the energy sector. EVs' environmental impact is further enhanced when powered by renewable energy sources. Their integration with renewable energy like solar or wind power contributes to a cleaner and more sustainable energy ecosystem. Embracing electric vehicles allows societies to diminish their carbon footprint, combat climate change, and strive for a cleaner, healthier environment. With emissions absent from the tailpipe, EVs substantially mitigate greenhouse gases and air pollution, and reduce reliance on fossil fuels.

With advances in EV technology, there is a shift towards more efficient battery use, leading to reduced resource consumption and waste. This supports resource conservation and promotes the development of sustainable materials and manufacturing processes.

SOCIAL

Electric vehicles yield positive social impacts as they aid in enhancing urban air quality and fostering

a healthier environment within cities, leading to a reduction in chronic respiratory diseases and associated medical costs. Widespread adoption of electric vehicles can enhance urban transportation systems, alleviate congestion during peak public transit hours, diminish stress while driving, lower the use of car horns and reduce the number of aggressive drivers on the road. In this respect, the integration of electric vehicles aids in noise reduction, fostering quieter and more habitable urban settings.

The expansion of the electric vehicle industry generates job opportunities and propels economic growth. The shift towards EV manufacturing, the establishment of charging infrastructure, and the development of associated services stimulate job creation and economic development. Notably, the rising demand for EVs has catalysed investments in manufacturing, research and development, and infrastructure deployment. This positive social impact contributes to the overall well-being of communities and fosters inclusive prosperity. These investments and the creation of job opportunities contribute significantly to local economies, nurturing inclusive prosperity and bolstering economic resilience.

GOVERNANCE

Regarding governance, the electric vehicle industry can influence corporate operations positively, requiring firms to prioritise decisions aligning with sustainable business models and corporate social responsibility. This empowers investors and consumers to back environmentally and socially responsible companies. Consequently, electric vehicles are acknowledged as an eco-friendly alternative with positive impacts on the environment, society, and governance within an ESG framework.

ESG considerations hold pivotal importance within the corporate governance practices of the electric vehicle industry. Embracing electric vehicles and nurturing the growth of this industry allow stakeholders to actively propel the transition towards a more sustainable future. Collaborative efforts among Governments, businesses, and individuals are imperative to tackle challenges and capitalise on opportunities presented by

electric vehicles, ensuring a cleaner, fairer, and more prosperous world for future generations. By integrating ESG principles, the electric vehicle industry can lead the charge toward a greener and more sustainable transportation landscape.

The automotive safety standard for Electric Vehicles, ISO 26262, is an international functional safety standard for the development of electrical & electronic systems in vehicles on the road. It explains the criteria necessary for the safety-critical function of the system, along with the methods, processes, and tools employed during the development phase. The standard ensures that sufficient levels of safety are being met and maintained throughout the vehicle lifecycle.

CHALLENGES

Before we can reap the benefits of an EV ecosystem, we must first address the primary challenges faced by the EV industry [6] [7]. We also will provide some measures that can be taken to overcome them.

Range Anxiety

Challenge: Fear of an EV not having enough charge to complete a journey.

Solution: Continuous advancements in battery technology, increasing ranges per charge; education on the realistic range for most daily trips.

Charging Infrastructure

Challenge: Insufficient rapid charging points, hindering EV purchases due to concerns about convenient recharging.

Solution: Ongoing expansion of public chargers, including fast-charging options; development of home and workplace charging points.

Charging Speed

Challenge: Variations in charging speeds cause inconvenience and longer wait times.

Solution: Standardisation and clarity in charging speeds across different charging stations; advancements in ultra-rapid charging technologies.



Figure 3: Electric Vehicle charging [9] (Credit: Getty)

Charger Compatibility

Challenge: Incompatibility issues between charge points and EVs, leading to frustration for users.

Solution: Ensuring universal compatibility or providing adapters to resolve connection issues between charging points and various EV models.

Electric Vehicle Cost

Challenge: High initial purchase prices of EVs.

Solution: Review manufacturing costs to make EVs more affordable; increase competition to drive down prices.

Limited Electric Vehicle Selection

Challenge: Limited options of EV models available, restricting consumer choices.

Solution: Rapid expansion in EV offerings by various manufacturers, catering to diverse consumer needs and preferences.

Green Grid Capacity

Challenge: Insufficient renewable energy sources to power the increasing number of EVs.

Solution: Investments in renewable energy infrastructure to meet the growing demand; advancements in grid technology for more efficient and sustainable power distribution.

Radiation Concern

Challenge: Perceived health risks associated with electromagnetic fields around charging stations.

Solution: Continual research and assurance of safety standards compliance; public education regarding the minimal health risks posed by EV charging infrastructure.



Figure 4: Tesla Inc. signage during a launch of company's Model Y electric vehicle in Kuala Lumpur, Malaysia, on Thursday, July 20, 2023. [10] (Bloomberg | Bloomberg | Getty Images)

Addressing these challenges is crucial for the broader acceptance and successful integration of electric vehicles into mainstream transportation systems. Research in these areas should aim to address technological limitations, improve performance, reduce costs, enhance sustainability, and further accelerate the adoption of EVs [8].

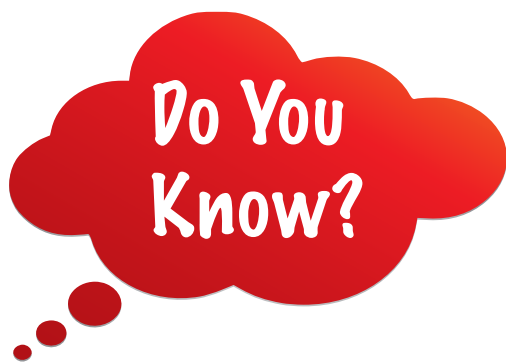
CONCLUSION

The emergence of the electric vehicle sector stands as a potent force propelling the adoption of Environmental, Social, and Governance principles. The environmental advantages of decreased emissions and the integration of renewable energy align with the environmental facet of ESG. Concurrently, electric vehicles drive social progress by improving air quality, bolstering public health, and stimulating inclusive economic growth. The industry's commitment to responsible corporate governance and technological advancement further emphasises its alignment with ESG principles.

Collectively, research indicates that global collaboration and policy interventions wield a substantial influence on global electric vehicle uptake, emphasising the imperative for collaborative efforts among stakeholders across diverse sectors to optimise the efficacy of these policies, and standardisation efforts to establish common standards for charging infrastructure, batteries, and vehicle-to-grid technologies. ■

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Environmental, Social, Governance (ESG)

By Pang Soo Mooi

ESG adoption is on the rise, fuelled by client demand and a desire to make an impact. As ESG momentum continues to gain steam, investors are refining and evolving their strategies. The demand from investors for more ESG transparency and accountability, together with regulatory changes around the world, creates a broad range of challenges.

Bursa Malaysia ESG Reporting Platform

Bursa Malaysia Securities Bhd on December 2023 unveiled the Bursa Malaysia ESG Reporting Platform, which will act as a repository for disclosures conforming to the prescribed format mandated under Bursa Malaysia's enhanced sustainability reporting requirements introduced on September 26, 2022. According to its chief regulatory officer, this puts our listed issuers in good stead as Malaysia raises the bar for more robust ESG disclosures over the next few years.

Malaysia's NDC

The Malaysian Government announced in June 2023 that it is determined to be well-positioned to play its part in reducing emissions while ensuring

that it is ready for the growth of the low-carbon economy.

For that, Malaysia has revised its Nationally Determined Contribution (NDC) to reduce the intensity of greenhouse gas emissions by 45% by 2030 compared to 2005 levels, as part of the nation's responsibility towards overall global climate targets.

The efforts towards achieving Malaysia's NDCs have been incorporated into the 12th Malaysia Plan and the National Energy Policy 2022 – 2040 (NEP 2040). This policy document strategically charts the way forward and outlines key priorities for the energy sector in the coming years.

It positions the energy sector as a key catalyst for socio-economic development, and its progressive Low Carbon Nation Aspiration will ensure that the Malaysian economy is able to capitalise on opportunities arising from the energy transition to remain resilient and sustainable.

ESG Global Study – Harvard School

ESG integration remains the top implementation strategy, showing how investors are taking a holistic approach as they look to comprehensively embed ESG into the investment process.

This rigorous approach is also evident in the strong bias towards active strategies. Nearly two-thirds prefer active funds to integrate ESG. Investors therefore want managers to use active security selection to uncover ESG opportunities and active ownership to engage and influence investee companies.

The increasing sophistication of ESG investors can also be seen in their attitude towards the UN Sustainable Development Goals (SDGs). Almost a third say that the ability to report on specific SDGs is one of the most important elements of fund sustainability reporting – nearly double last year's percentage. Half say the ability to offer the full spectrum of SDG themes is important when selecting funds.

Crucially, as investors expand their ESG knowledge base, they increasingly recognise that companies with good sustainable credentials are more likely to outperform. Fewer investors this year point to sacrificing returns as an adoption hurdle. And more are now investing in ESG

with the specific and sole remit of generating alpha. Furthermore, investors largely agree that investment returns and sustainable impact go hand in hand.

As investors become more knowledgeable and familiar with ESG, they are becoming more cognisant of the challenges. Data challenges continue to be a critical issue that manifests throughout the investment process. Difficulties with the quality and accessibility of data and inconsistent ratings are hampering the ability of investors to adopt, incorporate and implement ESG.

These issues also present themselves to fixed-income investors who identify a lack of standardisation across ESG bond ratings as the top barrier.

Such difficulties are compounded by the fact that investors face an information overload as they swim against a tidal wave of ESG data.

It is therefore essential that investors seek help from active managers who possess the specific tools, skill sets and resources to address these challenges. Using proprietary research and fundamental analysis, active managers can bypass the problems created by superficial scoring systems and a lack of consistent and reliable data.

The support of asset managers is paramount as the knowledge paradox plays out — the more investors know about ESG, the more they realise what they don't know and the more help they need. Indeed, a third of investors say on-going ESG education and training from their employer would help with ESG analysis and implementation. This skills gap presents an opportunity for asset managers to forge closer ties with investors through the provision of educational materials and resources.

Five ways that ESG creates value – McKinsey

Business is deeply intertwined with environmental, social, and governance (ESG) concerns. It makes sense, therefore, that a strong ESG proposition can create value.

A framework for understanding the five key ways it can do so is as follows:

- a) The “E” in ESG, environmental criteria, includes the energy your company takes

in and the waste it discharges, the resources it needs, and the consequences for living beings as a result. Not least, E encompasses carbon emissions and climate change. Every company uses energy and resources; every company affects and is affected by, the environment.

- b) S — social criteria — addresses the relationships your company has and the reputation it fosters with people and institutions in the communities where you do business. S includes labour relations and diversity and inclusion. Every company operates within a broader, diverse society.
- c) G — governance — is the internal system of practices, controls, and procedures your company adopts to govern itself, make effective decisions, comply with the law, and meet the needs of external stakeholders. Every company, which is itself a legal creation, requires governance.

ESG is an inextricable part of doing business. Its individual elements are themselves intertwined. For example, the social criteria overlaps with the environmental criteria and governance when companies seek to comply with environmental laws and broader concerns about sustainability. The focus is mostly on environmental and social criteria, but, as every leader knows, governance can never be hermetically separate. Indeed, excelling in governance calls for mastering not just the letter of laws but also their spirit, such as getting in front of violations before they occur, or ensuring transparency and dialogue with regulators instead of formalistically submitting a report and letting the results speak for themselves.

Five links to value creation

These five links are a way to think of ESG systematically, not an assurance that each link will apply, or apply to the same degree, in every instance. Some are more likely to arise in certain industries or sectors; others will be more frequent in given geographies. Still, all five should be considered regardless of a company's business model or location. The potential for value creation is too great to leave any of them unexplored.

- a) **Top-line growth:** A strong ESG proposition helps companies tap new markets and expand into existing ones. When governing

authorities trust corporate actors, they are more likely to award them the access, approvals, and licenses that afford fresh opportunities for growth.

- b) **Cost reductions:** ESG can reduce costs substantially. Among other advantages, executing ESG effectively can help combat rising operating expenses (such as raw-material costs and the true cost of water or carbon), which McKinsey research has found can affect operating profits by as much as 60%.
- c) **Reduced regulatory and legal interventions:** A stronger external value proposition can enable companies to achieve greater strategic freedom, easing regulatory pressure. In fact, in case after case across sectors and geographies, we've seen that strength in ESG helps reduce companies' risk of adverse Government action. It can also engender Government support.
- d) **Employee productivity uplift:** A strong ESG proposition can help companies attract and retain quality employees, enhance employee motivation by instilling a sense of purpose, and increase productivity overall. Employee satisfaction is positively correlated with shareholder returns.
- e) **Investment and asset optimisation:** A strong ESG proposition can enhance investment returns by allocating capital to more promising and sustainable opportunities (for example, renewables, waste reduction, and scrubbers). It can also help companies avoid stranded investments that may not pay off because of longer-term environmental issues.

Sovereign ESG Data Framework – World Bank

The World Bank curates and maintains a wide range of ESG data for policymakers, financial market participants and academic researchers.

Environment

The Environment pillar measures the sustainability of a country's economic performance given its natural resource endowment, management,

risk or resilience to climate change and other natural hazards. It pays particular attention to the internalisation of environmental externalities created by economic activity. It also accounts for sustainable energy access and food security, crucial factors for stable long-term economic growth.

Social

The Social pillar quantifies the sustainability of a country's economic performance concerning its efficacy in meeting the basic needs of its population, reducing poverty, managing social and equity issues and investing in human capital and productivity. This category also includes demographic criteria, pertinent to stable long-term economic growth.

Governance

The Governance pillar describes the sustainability of a country's economic performance in the context of its institutional capacity to support long-term stability, growth and poverty reduction. This category also accounts for the strength of a country's political, financial and legal systems and capacity to address environmental and social risks.

Investors want to hear from companies about the value of sustainability – McKinsey

While major investors believe that ESG is important, they need greater clarity about the ESG value proposition. Sustainability aspirations or metrics on a page, without context, are not sufficient to link initiatives to cash flow. That lack of clarity presents an opportunity for companies to make the ESG-to-value case more clearly.

Long-term-minded investors—"intrinsic investors"—have an outsize effect on stock performance over time. These investors recognise that ESG will affect value, but they always want to dig deeper. They seek out granular information about how specific ESG initiatives can be a source of growth and which risks are most material to a specific company and its broader industry, and the extent to which distinct ESG actions can mitigate those risks.



“Executives should be able to identify the direct link between a company’s ESG strategy and its value creation strategy.”

Quest for clarity

About 85% of the chief investment officers we surveyed state that ESG is an important factor in their investment decisions. 60% of respondents review their overall portfolio for ESG considerations, and about 80% assess individual company positions in the context of how ESG affects forecasted cash flows. Strikingly, a significant majority are prepared to pay a premium for companies that show a clear link between their ESG efforts and financial performance.

Surveyed investors are also eager for clearer ESG standards. They understand that ESG scores today, unlike financial ratings, don’t correlate fully among ESG score providers. While financial ratings correlate at around 99% among providers, ESG ratings can correlate at less than 60% because of the different elements and weighting each agency assigns to various ESG metrics.

How does this strategy create value?

Executives should be able to identify the direct link between a company’s ESG strategy and its value creation strategy. To be credible, that connection should not be a checklist recitation of initiatives with a high-minded vision. Rather, companies should be able to walk investors through, in a reasonably granular way, why they chose the ESG initiatives they did, and how they will create value in terms that investors traditionally understand. That is, “How will this ESG strategy enhance (or sustain) cash flows, return on capital, and margins, mitigate risks, affect top-line growth, and attract and retain the talent needed to produce these results?”

The Economic and Social Rights Performance Score – World Bank

The Economic and Social Rights Performance Score is one of the new additions to the Sovereign ESG data portal. This indicator was developed by the Human Rights Measurement Initiative (HRMI) and spans 189 countries between 2007 and 2018. As part of the Governance pillar, the data set measures how effectively countries use their economic resources to ensure the fulfilment of five economic and social rights—the right to education, food, health, housing and work.

Adjusted for income bias

One of the most attractive features of the Economic and Social Rights Performance Score is that its methodology naturally adjusts for the ingrained income bias. Many of the widely used ESG indicators are afflicted by income bias. In the context of ESG investing, using unadjusted scores to guide investments can potentially lead to perverse outcomes, since richer countries tend to have better ESG scores, allocating investments based on ESG scores that are afflicted by this bias may inappropriately divert capital away from lower-income countries toward higher-income countries. The Economic and Social Rights Performance Score strips out the income bias by computing the scores in relation to the so-called achievement possibilities frontier and the natural minimum threshold. The frontier traces what the best-performing countries have shown to be achievable at each income level. ■

Carbonisation Technology Assessment - Environmental Management & Sustainability in the Oil and Gas Industry

By **Ir. Ts. Fazli Rahim, Noor Suhailah Othman, PETRONAS**

**Dr Mark Narimi Sueyoshi, Dr Okamura Kazuo, Dr Tasaki Masaharu,
Itazu Masaharu Shimizu Corporation**

**Nurul Naadia M Nasir, Sufyan M Nor, Achmad Bakhtiar M Yuni,
Malaysian Refining Company Sdn Bhd**

Sustainability is important for companies and corporations as it creates value for them and their stakeholders, obtains access to more capital and transforms businesses into stronger brand values. It also helps companies to identify risks and opportunities, leading to better strategic decisions. PETRONAS has long started its sustainability journey with the establishment of the Corporate Sustainability Framework in 2001. It has evolved over time until the establishment of our Net Zero Carbon Emission by 2050 (NZCE 2050) aspiration. PETRONAS became Southeast Asia's first oil and gas company to declare its aspiration of achieving net zero carbon emissions by 2050, representing a significant shift in its long-term growth strategy.

PETRONAS' Statement of Purpose, "A Progressive Energy and Solutions Partner Enriching Lives for a Sustainable Future", emphasises that as a purpose-driven organisation, sustainability considerations contribute directly to what PETRONAS does and operates as a business, and how it engages multiple important stakeholders including employees, customers, suppliers, service providers, local communities, regulators, investors and other stakeholders. One of the important levers to achieve PETRONAS' NZCE 2050 is the adoption of a circular economy in our business strategies and operations. A

circular economy will progressively be one of the enablers for a low-waste future, steward natural resources and minimise carbon footprint. One of the key approaches adopted is "waste to product", where wastes are converted to base materials, products or other goods. To demonstrate how a circular economy can help in achieving NZCE 2050, assessments were done to investigate the possibility of reducing our hazardous waste generation via technology.

One key pilot project conducted by PETRONAS' Group Health, Safety and Environment (GHSE) is exploring a feasible waste reduction technology that can reduce identified types of hazardous waste at our operations. It all started as a Technology Challenge organised in 2019 to look into solutions for Health, Safety & Environment (HSE) pain points. The project aimed to explore any new innovative solution for achieving a "cradle to cradle" philosophy with a zero waste end in mind, achieving the circular economy concept (3R) and reducing the cost of waste disposal or recovery.

An initial collaboration effort was made between GHSE and Shimizu Corporation Japan, in assessing carbonisation technology widely used in Japan for effective waste management. Shimizu Corporation, supported by its Institute of Technology and with funding from the Japan Center Co-operation Petroleum & Sustainable

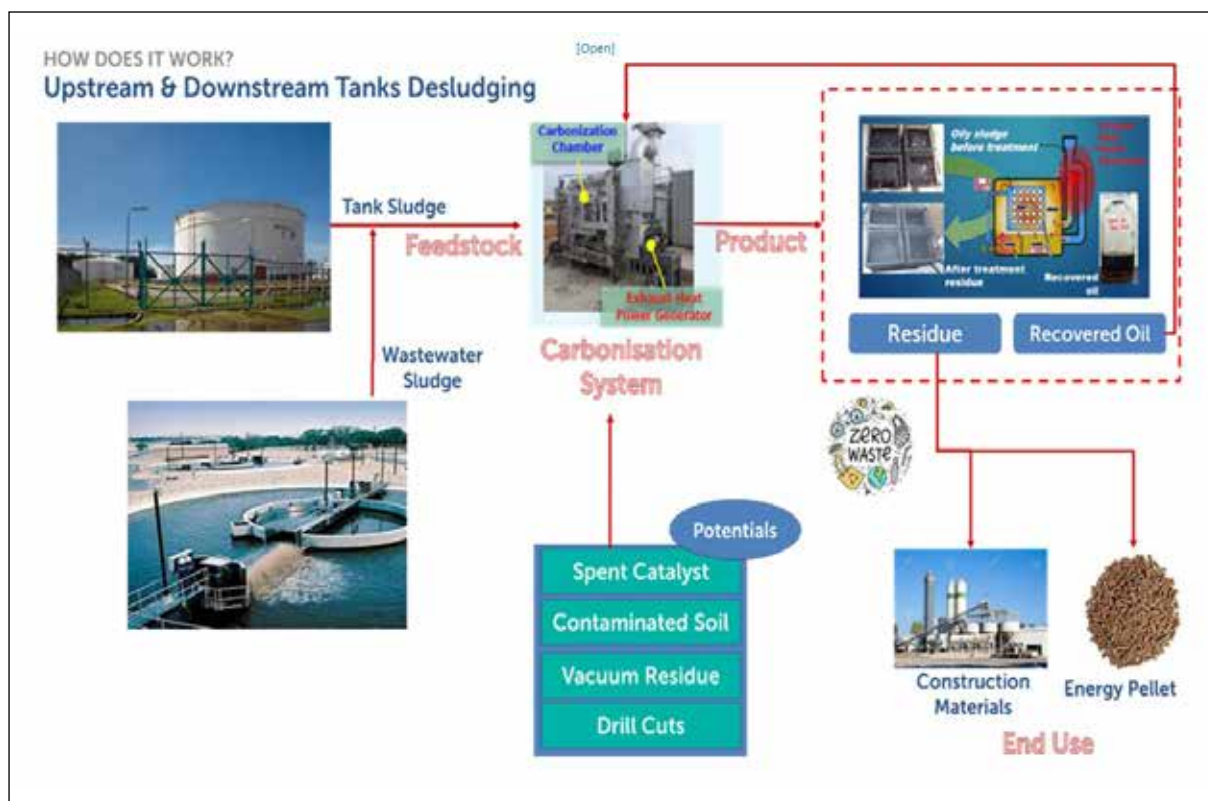


Figure 1: Carbonisation system simplified process flow

Energy (JCCP), had proposed a two-phase pilot programme to be conducted at selected PETRONAS sites. The proposal was realised after a pilot site in Malaysian Refining Company Sdn Bhd (MRCSB) was identified in 2021, and further solidified with a pilot agreement signed between MRCSB and Shimizu Corporation in January 2023, with JCCP as the pilot project sponsor. The pilot programme is important for concept proofing and to determine the technology readiness level for potential upscaling in the future. “Assessing and testing our hazardous waste using Shimizu’s carbonisation technology will enable us to efficiently enhance 3R of our hazardous waste, giving a positive impact and reducing harm to the environment wherever we operate,” said Dr Salmaan Hussain, Head of Environment, Social Performance & Product Stewardship.

Carbonisation Technology Process

Managing hazardous wastes, especially oily sludge from various industrial activities during explorations, production, transportation, storage

and refining of crude oil, is a known challenge to be tackled globally due to the increase in crude oil production from 2,868 million tons in 1973 to 4.141 million tons in 2020 (Niu et al., 2022). Approximately five tons of oily sludge is generated from every 1,000 tons of crude oil (Teng et al., 2021). There is limited literature produced on this technology for oil and gas industries, and it was reported that a few companies have already ventured into this space, including PetroSA, PetroChina and Chevron. Studies reported the use of carbonisation for biomass (Pelaiez-Samaniego et al., 2022) and other applications.

Carbonisation technology (see Figure 1) is a process involving the heating of substance (waste) to 500°C – 600°C in the absence of oxygen which will convert the waste into carbonised materials. It also recovers almost 99% of oil from oily sludge, which is used to heat the system (energy recycling), reducing almost 95% of waste volume. The main advantages of waste carbonisation are, firstly, energy recovery, where the carbonisation of waste produces biogas or fuel gas which can be used as an energy source to energise the carbonisation unit. Secondly, it reduces the volume of waste

No.	Waste	Origin	Water content	Ignition Loss	Oil Content
			%	%	mg/kg-dry
1	Spent clay	Used clay filter from kerosene treating unit	14.3	7.2	162,000
2	Spent activated carbon	Demin water treatment	18.6	78.3	3,800
3	CTP	Sludge from effluent water treatment (physical chemical treatment)	75.9	34.2	206,000
4	RIB	Oily surface water in remote impounding basin that contains sludge	29.9	91.8	684,000
5	VGO	Vacuum gas oil from tank maintenance and desludging	25.0	95.3	874,000

Table 1: Identified refinery hazardous wastes for testing and initial characterisation results.

significantly (80-90% from the initial waste weight), reducing the footprint for disposal, the treatment costs and further treatment. Carbonisation also produces charcoal that can be used as fertiliser or soil conditioner and reduces greenhouse gas from waste as the carbonisation process stabilises the organic matter in waste, thus reducing gas emissions from decomposition. The targeted waste for assessment is sludge waste from wastewater operations and oily sludge from tank cleaning activities, with other types of wastes such as used activated carbons being considered.

Pilot Testing Procedures

The pilot testing programme was planned in two phases – in 2022 and 2023. Phase 1 was conducted using a smaller 200L carbonisation kiln in December 2022 (see Photos 1 & 2). Phase 1 was conducted using refinery hazardous waste samples as in Table 1. The samples were selected based on waste availability and generation amount. The baseline results before carbonisation testing showed that Compagnie Technique des Petroles (CTP) system sludge had the highest water content of 75% while spent clay had the lowest water content of 14.2%. Vacuum Gas Oil (VGO) sludge and remote impounding basin (RIB) sludge samples have the highest oil content (684,000-874,000 mg/kg-dry) and aligned with ignition loss

of 91.8% and 95.3%. Spent clay, CTP and RIB samples have significant amounts of hydrocarbon content with low boiling points. In general, most of the waste was high in hydrocarbon content and suitable for testing with a carbonisation unit, since the unit can recover significant amounts of hydrocarbon content based on the volatilisation process.

After the baseline characterisation analysis, all five samples were assessed using a 50kg carbonisation kiln. The testing process is simplified as follows:

The carbonisation system was installed at the pilot site in the MRCSB refinery in the identified area equipped with a low-pressure steam utility line. Waste samples were then prepared with a predetermined amount in treatment trays, with a calculated oil load. Low-pressure steam was then injected and the kiln door was sealed. Steam was continuously supplied to drive away oxygen for an inert atmosphere and efficient heating, and initially, diesel was burned to start indirect heating. Then, hydrocarbon gases, which volatilise at higher temperatures, replaced diesel as heating fuel. The heating was stopped when the carbonisation chamber hits 600°C, completing the carbonisation process. To prevent damage to equipment, blowers automatically run until temperatures drop. The system was then allowed to cool overnight. When the carbonisation chamber temperature fell below 50°C, the



Photo 1: Carbonisation system pilot chambers (50kg kiln)



Photo 2: Carbonisation Project Team

Waste	Weight Change (g)			Inlet			Outlet			HC Removal Rate
				Water	Ignition Loss	Oil	Water	Ignition Loss	Oil	
	Before	After	Residual (%)	%	%	mg/kg-dry	%	%	mg/kg-dry	%
CLAY	1,000	755	75.5	14.3	7.2	162,000	0.5	1.4	229	99.86
AC	2,001	1,341	67.0	18.6	78.3	3,800	2.2	62.9	170	95.53
CTP	2,002	317	15.8	75.9	34.2	206,000	0.6	14.2	854	99.59
RIB	1,852	186	10.0	29.9	91.8	684,000	0.8	41.7	483	99.93
VGO	3,003	82	2.7	25.0	95.3	874,000	0.3	26.3	201	99.98

Table 2: Phase 1 pilot results for five hazardous waste samples from MRCSB

carbonised/treated samples were removed. To determine waste weight reduction, samples were weighed and analysed before and after treatment. One waste sample type was assessed per day using the above cycle.

Results & Analysis

The results for the Phase 1 pilot are shown in Table 2. In general, CTP sludge, RIB sludge and VGO sludge samples showed significant weight reductions ranging between 84.2 to 97.3% from the original weight, which corroborated with the high initial oil content (ranging between 206,000 to 874,000 mg/kg for all types of samples). Weight reduction for spent clay and spent activated carbon was low due to high mineral contents in both samples. For all samples, the oil removal rates ranged between 95.59% to 99.98%, showing very efficient oil removal from all samples. The results for all waste samples were promising. For the study of the residual content of treated waste samples, X-ray fluorescence (XRF) was used to assess four of the samples. Significant sulphurs were detected in RIB, VGO and CTP samples (17.2% to 43.8 %), with traces of silica, aluminium and iron detected. No other hazardous substances were detected in all four samples. The conditions of samples before and after carbonisation treatment are shown in Figures 2 and 3.

The Phase 1 pilot was successfully conducted in December 2022 and the results concluded that oil concentrations for most of the samples were reduced by the carbonisation system at a rate of more than 99% and the generated off-gas could be used to heat the carbonisation kiln, hence reducing the system's energy requirement. This feature will potentially reduce the energy requirement in the next project scale-up, where no additional fuel is needed to energise the system while treating the intended waste. The carbonisation system has also proven that the waste weight reduction of between 84.2% to 97.3% of initial weight for high hydrocarbon content wastes was achievable. Based on the initial calculations, it is expected that the cost savings per tonne of waste from the carbonisation system will be significant compared to waste treatment via disposal or other treatments, depending on the quality of wastes and any further treatment required to treat the generated residual. As for activated carbon samples, the treated activated carbon was considered regenerated and can be reused. Further testing will be done in the Phase 2 pilot to validate the conditions of activated carbon samples.

A subsequent Phase 2 pilot was carried out at the MRCSB site until mid-November 2023, where a bigger carbonisation kiln (1700L) test equipment was used to cater for larger waste loads. After the completion of the Phase 2

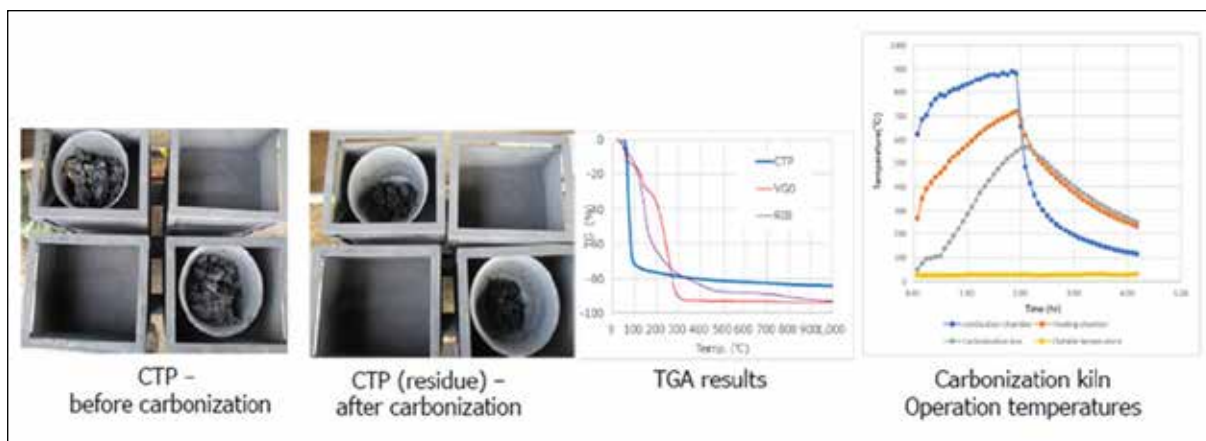


Figure 2: CTP (wastewater sludge) with 99.7% oil removal and 83-85% weight reduction

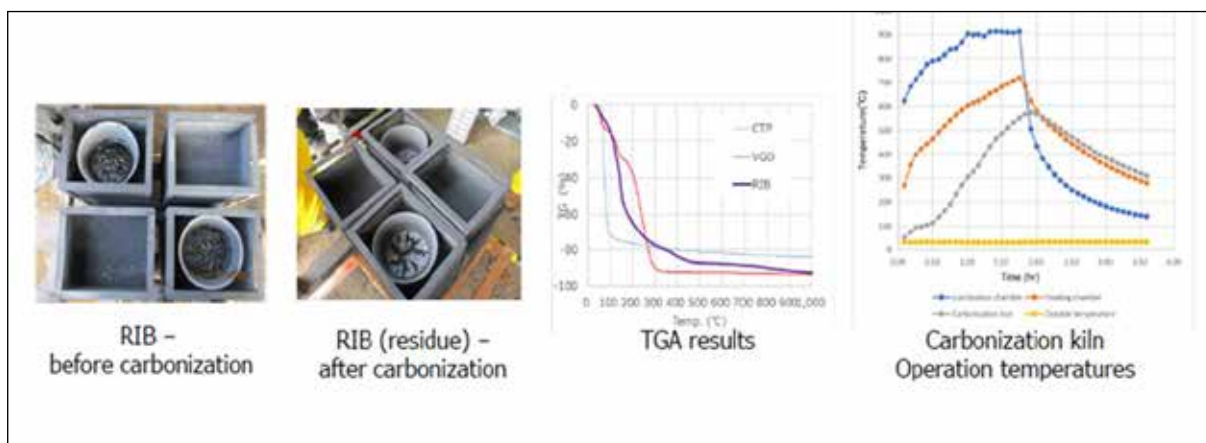


Figure 3: RIB (wastewater sludge) with 99.4% oil removal and 88-90% weight reduction

pilot, both Phase 1 and Phase 2 results were analysed to determine the potential for the up-scaling of this technology. Future works to be considered for this technology include determining the waste feedstock availability and security, determining the characterisation of residue and the potential end-use, such as construction materials, energy pellets or other uses (potential collaborations with research centres or universities) and testing different types of hazardous waste with potential for treatment.

To further explore and validate the project feasibility, the PETRONAS team took the opportunity to visit the Shimizu Corporation headquarters and witnessed the operational carbonisation scale at their partner's plant in Gifu Prefecture, Japan in June 2023. The work visit

provided more insights into the carbonisation technology used to treat not only hazardous wastes, but also domestic wastes, including plastic, and turning them into reusable oil (see Photos 3 and 4).

In summary, carbonisation technology is one of the assessed technologies for the treatment of hazardous waste that has shown potential for scale-up, based on Phase 1 pilot testing conducted in MRCSB in December 2022. After the completion of Phase 2 in December 2023, further evaluation for technology readiness will need to be conducted to evaluate the scale-up process. Based on preliminary results, the potential reduction of hazardous waste can be achieved and aligned to meet Sustainable Development Goal 12 (ensure sustainable consumption and production patterns). ■



Photo 3: PETRONAS and Shimizu Project Team at Shimizu Headquarters, Tokyo



Photo 4: Carbonisation Plant in Gifu Japan

Acknowledgement

The project team would like to acknowledge support from Malaysian Refining Company Sdn Bhd for the pilot site and project fund by Japan Center Co-operation Petroleum & Sustainable Energy .

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Safety & Health – Towards Formation of a Safety-Centric Workplace Culture

By **Ir. Kalyana Lakshmi Raman,**
Principal, Asia SH&E Management

Prof. Ir. Dr Satesh Namasivayam,
Professor of Mechanical Engineering, Sunway University

The Malaysian Occupational Safety & Health Master Plan 2021-2025 (OSHMP25), together with the recently amended Occupational Safety and Health (Amendment) Act (2020) and Act 835 Factories and Machinery (Repeal) Act 2022, sets out and describes the construct for encompassing and embedding systems and processes that provides greater protection to workers and drives greater accountability on employers for safety in the workplace, with a clear intent to enforce and grow robust, high quality and sustained occupational safety and health (OSH) compliance performance across all sectors.

At the Annual General Meeting and Asia Pacific Occupational Safety & Health Organisation (APOSHO) 2023 conference held in Kuala Lumpur on October 25, 2023, Deputy Prime Minister Datuk Seri Fadillah Yusof said the statistics from the Department of Occupational Safety and Health (DOSH) revealed that there were 2.22 workers per 1,000 involved in occupational injuries and 2.06 workers per 100,000 involved in fatal occupational accidents, noting an increase in occupational injuries from 21,534 cases in 2021 to 34,216 in 2022.

Datuk Seri Fadillah Yusof went on to call on all relevant parties, including employers, employees and non-Governmental organisations to unite in their efforts to ensure that the workplace remains a secure, healthy and hazard-free environment.

“...OSHMP25 is a concerted and continuous effort towards creating a safe and healthy work culture in Malaysia as well as increasing the compliance level of OSH in the country...”

Director General of Department
of Occupational Safety and Health Malaysia

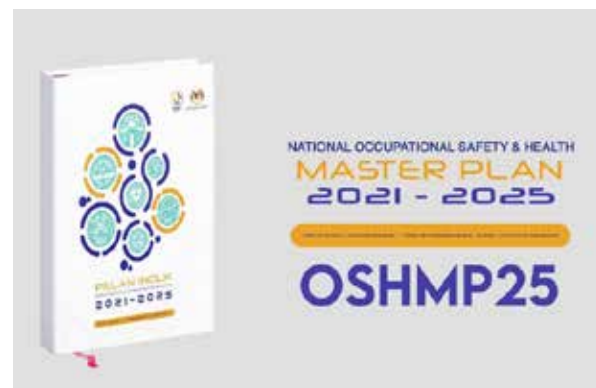


Figure 1: National Occupational Safety and Health Master Plan 2021 – 2025

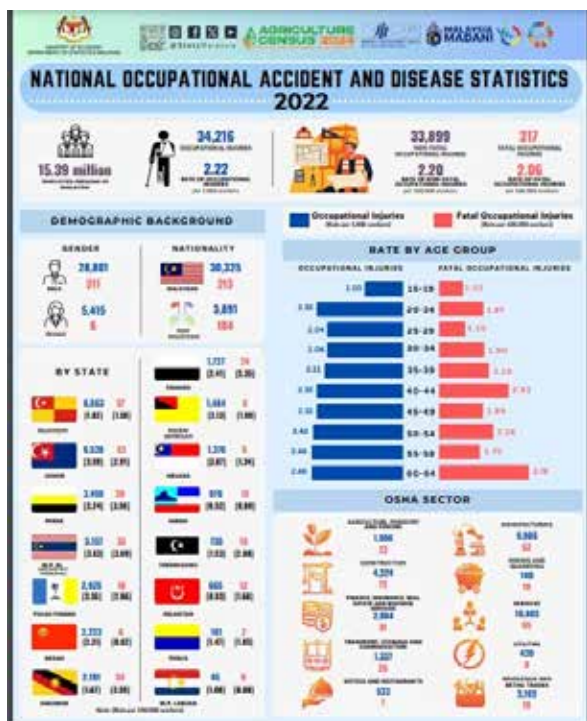


Figure 2: National Occupational Accident and Disease Statistics 2022

“...It is my fervent hope that, together, we can create a workplace environment that is both safe and healthy where employees can work with confidence and comfort. By raising awareness, bolstering protection and adopting best practices, I am confident we can prevent unwanted workplace accidents, injuries and occupational diseases...”

Deputy Prime Minister
Datuk Seri Fadillah Yusof

The following article on safety and health aims to describe, with simple supporting information and guidance, a framework, style and approach to help companies underpin a transition from a rudimentary traditional safety department mindset to the formation of a transformational safety-centric workplace culture involving all employers and employees — a key pillar of the OSHMP25. A robust safety culture positions a company to leverage excellent safety performance as a competitive edge, drive brand reputation, attract clients and create shareholder value.

There is no single activity or “trick” which can be applied that will immediately bring about an improvement in safety performance. Moreover, many companies do carry out safety improvement activities to realise their safety vision and values. The anticipated improvement as a result of both past and present safety initiatives by a company’s senior management can only grow, not in the type of activities that are being applied

but in the will to make improvements happen and to put in the effort that is required, i.e. to constantly communicate expectations from the top, make line management accountable and get the responsibilities of all employees clear and accepted, never to compromise standards, to really put safety first!

Introduction

The majority of companies are committed to ensuring that every employee returns home as they arrive — injury-free. To support this expectation and ensure that companies are focused on the right goals, a number of things must occur: every employee must be trained to perform their jobs the right way; supervisors and company leadership must create the right atmosphere and culture for safe and quality production; and all employees must clearly understand the expectations and buy into this high level of performance.



Figure 3: Frequent effective exchange of safety expectations closes the gaps between safety policies and their practical implementation.

Leadership

An overwhelming majority of injuries are due to factors which are largely influenced by the company leadership. Whilst in most cases, senior company leaders understand the expectations and the roles that they play, it appears that the layer of management closest to the employees is not as effective for companies to truly realise their safety goals and targets. In many cases, systems and procedures are either ineffective or are not followed, and equipment and communication/training are inadequate to meet expectations, contributing to a failure around the application and execution of the tools and resources that have been made available to ensure work environments are safe and that behaviours are consistently applied to eliminate the risk of incident. This should not be perceived as solely a failure of the supervisor, but on how information and expectations are communicated and reinforced.

Job Planning and Hazard Recognition

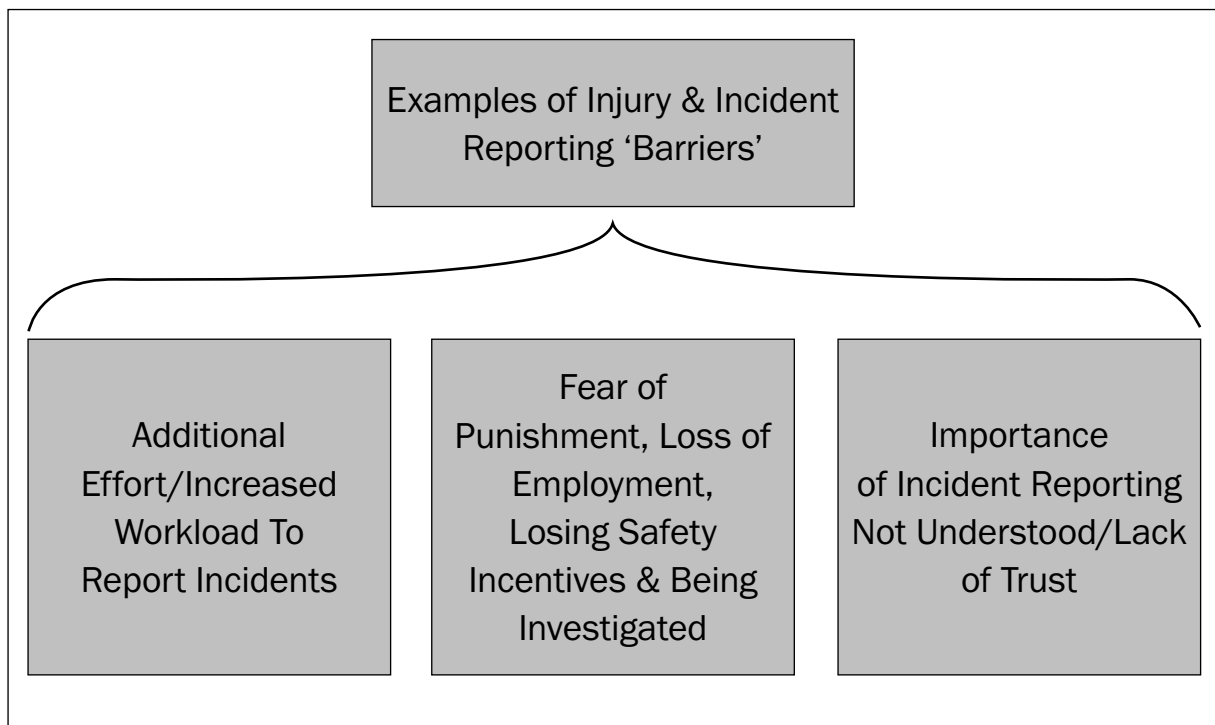
The ability to recognise hazardous conditions is essential to managing risk. Incident trend analysis suggests that workers simply do not recognise or anticipate all the potential hazards that can exist before performing their job or task. While Job Safety Analysis (JSAs) and Work Permits

“Communication that is clear, consistent and constant (3Cs) is essential when laying out safety expectations — it drives the basic foundation for a superior safety-centric workplace culture

exist in many companies, the quality of execution comes into question. In addition, where the jobs are not routine (e.g. chemical spill clean-ups and emergency maintenance) and do not contain specific planning steps, the incident frequency tends to be considerably higher. Experience notes that the split between the number of incidents between routine and non-routine categories is approximately 50%, with a large portion of the incidents occurring in non-routine tasks where the personnel involved considered the same tasks to be routine. Of the two categories, however, it would be reasonable to assume that routine tasks would contribute the most significant number of work hours, thus increasing real incident rates for those non-routine injuries.



Figure 4: Improperly co-ordinated and ineffective risk management will fail to identify and eliminate hazards.



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Incident Reporting

For many companies, incident rates remain the primary indicator of safety performance measurement. Incident rates provide a benchmark between one company and another and are commonly used throughout industry. Incident rates are lagging indicators — indications of past performance. Transforming incident rates from a lagging indicator to a leading indicator involves shifting the focus from historical data to robustly driving proactive measures like incident reporting. Incident reporting is crucial as under-reporting of safety incidents is always an undesirable trend since a lot can be learned from the aggressive review and management of not only serious and severe incidents but also First Aid Cases and Near Misses, which are indicators of underlying risks that have the potential to result in a more

significant injury. Companies must encourage open reporting by not setting targets for injuries and regularly communicating that the company cares for the individual. With a heightened sense of reporting, these cases will be hard to hide. Workers must also recognise and understand the consequences of not reporting incidents. Company leadership must ensure that analysis of incidents, across all areas, reflects and reinforces the importance of learning from incidents. Leadership must make reporting requirements clear to all workers, to ensure consistency in reporting, analysis and interpretation.

Safety Roadmap

Highlighted below are three recommendations that will help companies focus and shift efforts

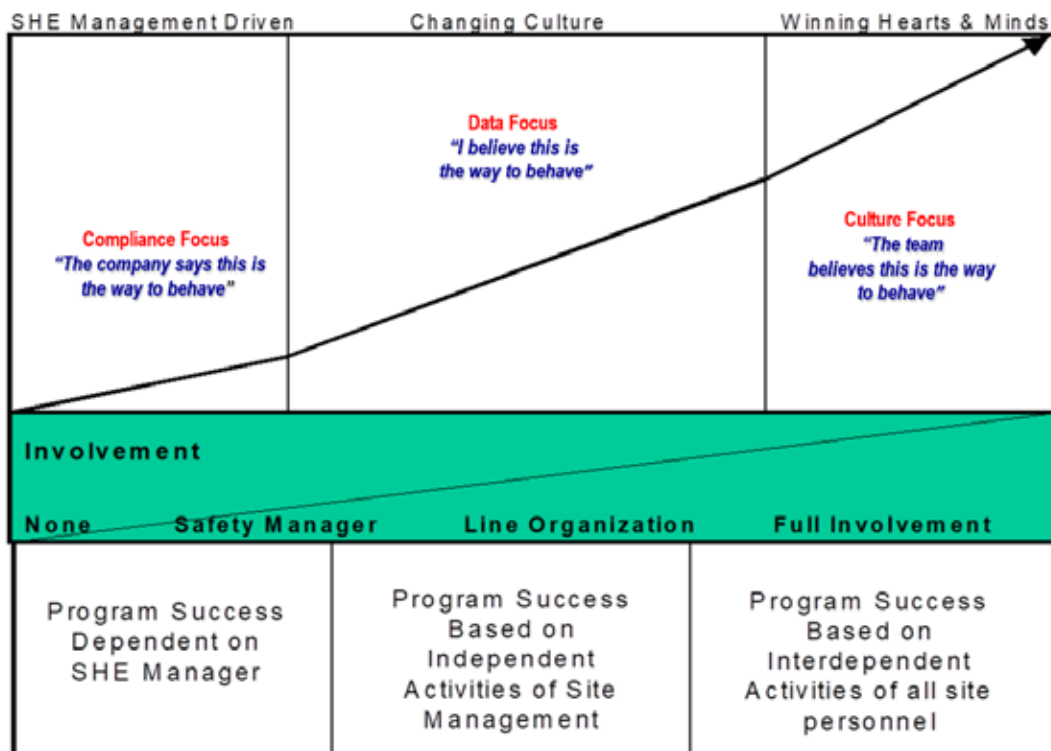


Figure 5: A symbiotic relationship exists between safety culture change and worker engagement

towards initiating the evolution of a safety culture change that is needed for such growth, as they strive to partner and support the needs and objectives of OSHMP25. The recommendations are straightforward but require considerable effort from management and employees for their implementation and continued success. The safety roadmap construct concludes with a “Blue Box” which contains a brief description of some specific ‘Needs and Opportunities’ for performance improvement.

RECOMMENDATION 1: Rules, Standards and Procedures

The foundation for safe working behaviour is in the system of safety rules, standards and procedures. These have to be comprehensive, respected and understood. Consistent enforcement will eventually generate the change and culture change behaviour will become “second nature”. Recognising that standards and procedures in many companies may already be available, a complete self-assessment and review should be completed to ensure that the standards and procedures are fully comprehensive (in particular including simple rules for “everyday” behaviour) and that the standards and procedures are kept alive in the minds of employees at all times. Procedures must be task specific. As an example, a site procedure for ladders should include not only the specification of approved types and registration/inspection requirements but also rules on how to use the ladders — three-point contact, no tools, no working off ladders, etc. Past experience may confirm these lessons but the lessons must find their way into the standard procedure and related training programmes.

RECOMMENDATION 2: Training Programmes

To ensure that rules and procedures are understood by everyone, employees must be able to access, discuss and, if required, participate in formulating or changing the contents of the rules and procedures. With the amount of rules and procedures in place, many of which are workplace-specific, the ideal plan would be to

provide workplace-specific training programmes. Encouraging these programmes to be organised and taught by personnel who have firsthand experience and practical knowledge of the tasks involved will help bridge the gap between theory and practical application, thereby enhancing the relevance and impact of the training. Customising communication to suit different learning styles and backgrounds together with regular assessments and feedback loops will help maintain the quality and effectiveness of training conducted by such personnel.

RECOMMENDATION 3: Addressing Individual Behaviour

Safety in the workplace is a combination of three measurable components: the person, their environment and their behaviour. Addressing individual behaviour is the most important form of safety activity for a company — the area of safety improvement that requires the greatest degree of effort — to promote and drive the culture change envisioned. Assuming that companies already have ongoing programmes to promote safe behaviour, the existing programmes may require further commitment as individual situations are examined and corrective actions put in place. The opportunity to use behaviour-based safety (BBS) observations on a much larger scale involving all employees to produce a significant measure of a company's safety performance (climate) at a particular point in time must be understood, as it will enable safety awareness to be increased, underpinning a process that helps employees identify and choose a safe behaviour over an unsafe one.

PROCESS FOR IMPLEMENTATION

Safety improvement must be led by line management. Line management must carry out detailed implementation by establishing local improvement teams in each workplace area, with a representative composition of the workforce. The safety improvement team, through its detailed

knowledge of running the area, must plan, lead and monitor implementation, thereby securing ownership and increasing participation and involvement by virtue of the team members being present on the 'ground'.

Leadership from the top is the foundation for successful safety improvement. Managers must start to change the way they approach safety management. As the company grows in safety performance, this will involve a transfer of responsibility and activity to local teams at the site and will require progress to be dependent on local 'leaders/champions' emerging. Many individual leaders/champions for the various safety programmes will be required, who will lead/champion by example through individual dedication rather than prompting or receiving orders. The principles of safety leadership require responsibility to be cascaded down to the first-line supervisors and their leadership of local programmes should be actively encouraged.

The link between safety performance and plant reliability must also be explored in greater detail. Improved reliability not only reduces intervention in the process and therefore reduces

the opportunity for harm, but measures taken to improve safety can also improve reliability.

SUMMARY

Leadership accountability across the vertical slice of the company and sanction must be clearly defined and understood. Institutionalising safety considerations into job planning for routine and non-routine tasks allows a company to foster a culture that values hazard recognition. Without careful evaluation and preparation, employees who conduct non-routine tasks can be at risk of serious injury. Timely reporting of all incidents is essential for proactive risk management, enabling companies to implement corrective actions and cultivate a safer work environment. Safety must be driven by adherence to systems and procedures.

Excellent safety performance is not about selecting safe people but about a long process of education and training, looking ahead, managing risks and hazards, not only to avoid things going wrong but also trying to make sure that they go right — key elements in growing a safety-centric workplace culture. ■

Safety and Health: Needs and Opportunities

- How do you demonstrate leadership with respect to safety and health performance and how can this be improved — both from a senior management and frontline supervisor standpoint?
- What role does general supervisor development — outside the specific parameters of safety and health — affects the way they motivate, lead, empower, and hold employees accountable?
- What can you do as an organisation to improve the execution of job planning and hazard recognition tasks?
- What can you do as an organisation to promote the reporting of incidents?

Personal Perspective – Untapped Blue Carbon Opportunity

By Kevin Hor



Seagrass meadows have the capacity to offset CO₂ emissions

It took a trip to the Kuala Lumpur Performing Arts Centre (KLPAAC) for a show called “Seruan Setu” to educate this author on the existence of seagrass and how it is becoming increasingly endangered. While the original intent of attending the show at KLPAAC was to be mesmerised by some form of theatrical performance, the author was pleasantly captivated by the narratives about seagrass and its importance to both

marine life and coastal communities. Malaysia is home to 16 species of seagrass and is third in the world for seagrass diversity. While the author was not surprised at Malaysia’s biodiversity achievements and the fact that the seagrass ecosystem is currently threatened, what was surprising however was that this information was so far off the radar of the regular reading of the author. What attracted this author’s interest in

seagrass was seagrass's ability to contribute towards offsetting CO₂ emissions on a large scale, in addition to its ability to provide shoreline protection, improve water quality and as a habitat for fish populations.

Shell-shocked at my ignorance, I began searching for journal papers and other general information I could trawl off the Internet only to find that seagrass knowledge has close links with mangrove-related materials. Further reading unravelled more details on linkages with other nature-based solutions and the different carbon offset schemes available and supported by individuals and corporates worldwide. While the author does not claim to be an expert in seagrass, the author feels that it could be quite a shame should others like him be not made aware of seagrass and its possibility as an alternative nature-based solution in mankind's climate change mitigation possibilities.

Q1: Are carbon offsets from seagrass projects worth the effort and time?

Carbon sequestered in coastal ecosystems is commonly referred to as Blue Carbon. In a paper published by *Stankovic et al 2021*, seagrass was reported to be able to store carbon for centuries and seagrass meadows contribute to 10-18% of the total ocean oceanic carbon burial despite covering less than 0.1% of the total ocean floor. These staggering performance figures aroused the author's interest to consider them as an earth-shattering carbon offset programme. But would seagrass projects suffer the same fate as forestry credits which have received widespread criticism recently for overstating their CO₂ reduction abilities?

Q2: Are blue carbon offsets worth their pound of flesh?

We often hear about tree planting and other forestry-related carbon projects promoted as carbon sinks; however as timber is a commonly used commodity in economic development, it does not seem directly plausible for large-scale projects to be economically attractive, given the economic opportunity cost of avoiding cutting a tree down. For carbon to be captured and stored, the tree would need to be permanently maintained and never removed. Forestry

projects could suffer from an economic versus environmental dichotomy; could the same be said of seagrass projects?

Detractors of Blue Carbon argue that uncertainties in the measurement of carbon flows in coastal systems are much higher than the uncertainties in emissions in other sectors. Changes in coastal systems, permanence and leakage make it difficult to conduct measurement and verification activities.

Q3: Can we agree on the environmental and social benefits of seagrass?

Isn't it sufficient for parties who trade on a "willing buyer, willing seller" to arrive at a fair compensation for the maintenance and protection of such coastal ecosystems without further scrutiny and criticism? Is seagrass a commodity? If not why be pedantically strict about the measurement and verification of its carbon potential? Why should this be subject to an exact science given that the general consensus is that having/conserving such coastal ecosystem is good for the world? If international negotiations since the Kyoto Protocol have yet to produce a vibrant carbon market, why should extraneous attention be given to the measurement and verification of the potential of seagrass?

Q4: Could there be consequences if we do not decouple the tangible economic benefits of seagrass from a need for action?

There seems to be a lack of consensus on the idea that for the world to sustain further CO₂ growth, greater CO₂ mitigation and adaptation activities need to be put in place. No economy can bear the brunt of slower growth let alone zero growth. Germany's energy dilemma is one such conundrum which leaves many to wonder if a silver bullet exists for the climate challenges that humanity is currently facing. The paper by *Stankovic et al 2021* predicted that at the current loss rate, all meadows will disappear by 2060. Is current literature sufficient to compel immediate action to preserve seagrass meadows? Are the economic benefits sufficiently large to drive these activities? It is difficult to generate economic incentives for the conservation of coastal ecosystems such as seagrass because many of the improvements in water quality, and increased habitat for marine life do not have a market price.



Scientist assessing carbon sequestration rate

Should it therefore be possible for Blue Carbon to become the tool to incentivise the preservation of such land?

Q5: Where should policymakers stand on this matter?

Similar to forest and agricultural projects, offset credits are the *de facto* emissions trading scheme for seagrass projects which face low-cost offsets regardless of the origin of the credits. A marketplace and conservation approach coupled with an origination story behind the creation of the credits need to be promoted to support the broader strategic priorities of such projects. Japan will in 2024 begin to account for blue carbon in the national inventory calculations. For a resource-rich country such as Malaysia, it may seem like a loss of opportunity to not account for such contributions in Malaysia's inventory as well.

Of the possible nature-based solutions evaluated by companies worldwide, such as algae, that enjoy payment for ecosystem services and forestry carbon offsets, it makes one wonder if seagrass conservation and seagrass meadow cultivation might not be a better solution and should be prioritised since shoreline protection, improved water quality as

well as protection of habitat for fish populations are directly beneficial to our economic growth and yield shorter returns?

Author's hope

Carbon flows within the highly variable environment in the coastal zone raise questions as to whether emissions and removals are natural or anthropogenic. This makes it very difficult to measure the carbon impact of seagrass, and with the lack of data in many developing countries, estimates of carbon sequestration are highly uncertain. Would Malaysia be able to monetise the carbon from seagrass protection and conservation? Would Malaysia be able to increase tourism revenues by leveraging on seagrass diversity? What might the opportunities and investments be to develop baselines to support the creation of a seagrass carbon methodology for Malaysia? These questions remain unanswered but it is hoped that readers will become more aware of such a lesser-known climate mitigation solution.

At time of writing, it seems that Malaysia is not a member or partner of the International Partnership on Blue Carbon. With a greater demand for CO₂ offsets, would it not be a good time for Malaysia to actively participate and explore other CO₂ offset generation sources? ■

Trends – Communication Technology for Future Generations

By **Majidah Hashim, CSRA, CEFI**

My grandfather was a hospital administrator in 1956, when whispers of Malaya's independence reached Penang. He had lived through the Japanese and British occupations, and told me that news of freedom came like a rumour, and everyone was cautious, excited and hopeful at the same time.

Arriving from London on a ship, Tunku Abdul Rahman Putra Al-Haj had landed in Melaka in February that year, where he first declared the country's independence in Padang Bandar Hilir. It would be more than a year later, at a field in front of the Royal Selangor Club, when the Union flag was lowered on August 1957 and the new flag of Malaya was raised to the country's new national anthem, *Negaraku*.

I tried to imagine what it would be like to live through that sort of anticipation. To receive news of freedom and independence like a rumour. And then slowly receive bits of information. Over months and months and months.

I don't think I could.

Today, news travels around the globe almost instantaneously. We all know the instant a new K-pop album drops in the market, tickets to stadium concerts can sell out in a matter of minutes, and a paparazzi photo of a celebrity scandal can be retweeted millions of times before the celebrity even realizes it. Before official results have even been announced, mass media and social media pundits have been able to speculate election results, as we all watch vote tallies stack up in real time over a variety of communication channels.

If we transposed the proclamation of Malaya's independence with the communications technology we have today, the very signing of the Federation of Malaya Agreement would have been live streamed straight from Lancaster House in London. The ink on the paper would still be wet when millions of Facebook posts would be circulating around cyberspace celebrating our independence.

In a more recent example, one of the many reflections that we can draw from the COVID-19 pandemic global lockdown, is the important role of communication technology in keeping all of us, well, sane.

Thanks to communication technology, we spent endless hours indoors attending virtual meetings, organising online conferences, learning how to make sourdough bread and doing yoga in virtual groups in front of our computer screens. We will also not forget the many, many virtual open houses we attended as festivities, birthday parties and other social gatherings stretched over the pandemic period.

Again, I can only imagine what we would do, should the global lockdown have happened in say, in the 1980s before the availability of stable and affordable high-speed Internet. To illustrate this point, how many of us could actually go a day without connectivity? Half a day? A hour?

With the accelerated consumption, demand and competency for communication over recent years, here are just some considerations in communication technology for future generations.



Microchip under the skin, futuristic technology

Communication Technology will keep getting smaller and smaller

Yesterday's supercomputers have become today's laptops and smartphones - and is on a steady course to shrink much further. Smartphones have now taken the form of wrist watches and no, that is still not yet the smallest communication technology we have today.

Wireless data microchips, the size of a grain of rice, can now be fitted with RFID and NFC capability, to be implanted within the human body.

This technology has a number of applications. Medical records can be stored in these chips, enabling medical personnel to retrieve essential information especially in cases of accidents and emergencies. Key cards have also been successfully programmed into these chips, enabling its user to unlock doors of offices, homes and cars very much like a Jedi from Star Wars.

Travel records can also be stored in these chips, making passport-less travel a possibility. Payment gateways such as digital wallets can also

be programmed into these chips. And yes, there are already people walking around with more than one of these chips in their bodies.

Brain implant technology is not a new area of engineering. Applications range from cochlear implants and retinal vision prosthesis to aid hearing and vision loss, to neuro-modulation chips, electrode arrays and microprocessors to treat brain disorders such as anxiety and post-traumatic stress disorder (PTSD). More complicated implants in the human brain has also proven successful in enabling communication for sufferers of paralysis through brain-computer interface (BCI).

The question is now, how will this area of technology grow in the future? It is predicted that within this decade, technology would be created to manipulate memory function within the brain. In about two decades, this could be expanded to manipulate mood and personality functions. How humans communicate in the next few years can start to look very different, as our screens get smaller and possibly even disappear altogether in generations to come.

Increase in energy consumption and the race for a new source of energy

According to research, the information technology and communication sector could be consuming over 20% of all electricity produced by year 2025. The power consumption of 5G base stations is said to be at least twice of that of 4G stations, the equivalence of powering 73 households.

While there are arguments that 5G can enable better energy efficiency given its higher speed, less latency and greater capacity, we also need to consider the greater demand for data from users. The incorporation of digital technology into offices, homes, cars and even whole cities places a demand on energy as we have never seen before, and with limits that surpass our imagination.

There is therefore a need to innovate current sources of energy, and explore new ones. Again, this is not a new race. Development in hydro, solar, wind, tidal, hydrogen, nuclear, biomass and even geothermal energy technology has been moving at a breakneck speed in the past five years. There has also been keen exploration into new alternative sources of energy such as algae, jellyfish, alcohol, atomic fusion and harnessing cosmic energy from space such as from solar flares.

It is without a doubt that future generations will be fuelled by a new source of energy that would be powerful and sustainable enough to keep up with their growing demand. We are therefore left with two responsibilities - to create this future technology, and/or to create the technology that would enable this future technology to be created.

And just as a close to this heading, critical evolution is also needed in battery technology.

Life in Cyberspace and the Metaverse

Here are some quick statistics. Every ONE MINUTE in the year 2023: YouTube gains 500 hours of fresh new video content, 35 million people update their Facebook statuses, five million Google searches are made, 350,000 tweets are sent, and six people get hired on LinkedIn.

Post-pandemic, many organisations have seen benefits in remote and hybrid working arrangements, including here in Malaysia. Communication technology has enabled work

from home, online learning and socialising online to flourish, alongside the development of uncountable communication tools.

Nevertheless, the lines between reality and virtual has long been blurred, as younger generations start identifying, sharing and living more in the online space. The emergence and post-pandemic proliferation of e-commerce, digital transactions, e-wallets, QR payment and of course, cryptocurrency has brought our economy into the virtual space in a massive way.

So here is what the future generation will look like. They will be plugged in and they will be cashless. Intellectual, social and economic transactions will ride on communication platforms. These platforms will therefore need to be built with careful ethics and utmost security in mind.

Limits of Smart and Intelligent Technology

Limits? There aren't any. In negotiations over the writers and actors strike in the US, lawyers are now including contract clauses to ensure that artificial intelligence (AI) and machine learning (ML) elements are not used in their engagements. This is for fear that the physical likeness and voice attributes of the person are manipulated through technology without accreditation or compensation.

This concern is shared not only by the entertainment industry but, also a serious consideration in crimes. Communication technology has already arrived at a point where scams and hacks can now be carried out through AI image and voice manipulation.

Future generations are therefore likely to use communication technology that has more encryption embedded, but not to a point where it becomes intrusive. Crime and manipulation prevention technology will also need to keep up with this.

Data is currently at a crossroad, both where cybersecurity and aggregation are concerned. Development in this area would be very interesting to observe in the coming years as technology around data management become more sophisticated, and given the relatively positive and liberal outlook by the younger generation on data use.



Wearing VR glasses to experience the metaverse

Emergence of Internet as a Human Right

Since the early 2000s, there has been international civil societal and inter-Governmental talks, some even with declarations, on access to the Internet to be recognised as a human right. This is on the basis that fundamental freedoms, such as the freedom of expression and the freedom of opinion, has now come to ride on access to connectivity in upholding the Universal Declaration of Human Rights.

While these talks are currently suspended at a very high level, it is without a doubt that future generations will demand connectivity as a fundamental right.

Most of us adults in year 2023 have known and lived through the analogue life before the Internet, and have evolved to learnt how to use the Internet in adulthood. The same cannot be said for younger generations with much earlier exposure to the Internet. In fact, many communication technology now target infant and early childhood accessibility as part of their market. Today, it is not uncommon

to see babies and very small children interacting with screens and even developing dependence on digital devices.

Future generations will therefore live in not just a highly connected world, but would expect to interact in a completely connected world. These generations will not inherit our criticism of the dangers of over-connectivity, nor our scepticism over new development of communication infrastructure. In fact, they may very well demand it.

So how where do we go from here? How do we make sure that we are able to create communication technology that would sufficiently cater to future generations?

My two-word answer: Bravely and boldly.

The future generation is on a path towards using communication technology like we never could or would. Whether it is brain microprocessor implants, or jellyfish as the next big source of renewable energy, or mega cybersecurity - be brave, be bold. Chances are, it is probably not big enough. But we can try. ■



Versatile Tricycle Pickups in Rural China

By Dato' Ir. Fong Tian Yong

As I travelled across the length and breadth of southern China, I observed that mini tricycle pickups are a common sight all over the country, especially in rural regions where farm roads are narrow, winding and undulating. They also have a strong presence in mid-tier cities where small traders market their farm produce and sundry goods.

The mini tricycle pickups, are often referred to as “mini cargo tricycles”. In the rural areas, they are frequently used for transporting goods, especially in areas where larger vehicles may face challenges in navigating narrow roads or rough terrain. They are known for their compact size, versatility, and affordability, making them suitable for navigating narrow pathways and carrying loads on farms.

They usually have a front cabin for the driver with a handlebar for steering and are equipped with a small cargo bed or pickup truck-style bed at the rear for transporting various types of goods, such as agricultural produce, construction materials, or other commodities. They are known for their manoeuvrability and cost-effectiveness, making them popular in rural and less developed areas.



Photo 1: Typical tricycle pickup - a common sight in smaller towns and rural areas of China



Photo 2: Narrow and winding streets are a common sight in the hilly settlements of ethnic tribes in southern China's provinces such as Guangxi, Hunan and Guizhou.



Photo 3: The simplest type of tricycle pickup is a small open-cabin single-seat vehicle with motorcycle handlebars and a small pickup box at the back. The photos show a hawker selling breakfast on a Guangzhou street. It moves about the commercial area to catch the morning office staff coming out of subway stations en route to their offices. This particular pickup is driven by a petrol motorbike engine although more people are converting them to a battery-driven type.



Photo 4: This flat-bed type, powered by a battery kept below the seat of the driver with a rooftop that offers shelter against rain, is useful in areas with frequent rainfall.



Photo 5: This cabin-enclosed type offers complete shelter from rain and with a bigger loading capacity. Notice the brake handles and the wheel lock system in front of the carriage vertical bar just behind the driver seat. The loading capacity depends on the motor engine capacity. The wheel size is also bigger than a normal motorbike to cater for heavier loads.



Photo 6: Interior view of the bike handle of another similar type but without a door. Notice the foot braking system, petrol tank and simple outfit that makes maintenance easier and more cost-effective.



Photo 7: The more powerful petrol engine type. This model is driven by a 125hp engine and is used to carry heavier loads for short-haul within the mid-tier city of Nanning's old town goods dispatching centre in Guangxi province. Notice the double shock absorbers at the front wheel to cope with the heavy load it carries. (Photo courtesy of Huang Zhaoliang of CMQIP)



Photo 8: Online sales dispatch companies find this type of semi-enclosed mini pickup efficient for distributing parcels to customers at narrow streets or back lanes that the locals called 'xiang' or 'li'.



Photo 9: Even the Nanning City solid waste management uses tricycle pickups for transporting kitchen waste to the waste transfer station. The label at the side wall of the pickup box says 'leftover kitchen waste'. The blue signboard in the front of the transfer station reads 'work on environmental sanitation ongoing'



Photo 10: View of a hawker selling fruits with an umbrella attached to a bracket fabricated at the tail end of the mini pickup - simple and yet provides comfort to the hawker and the customers to choose the fruits under the hot sun or rain.



Photo 11: Modified tricycle with cabin for two passengers or goods that need to be shielded from rain and sun.

In urban areas, these ‘three-wheeled cargo motorcycles’ are popular for transporting goods and are widely seen for their manoeuvrability and efficiency in navigating through traffic.

One notable type is the “electric cargo tricycle,” which is powered by an electric motor. These vehicles are eco-friendly and contribute to the efforts to reduce air pollution in urban environments. They typically have a small cabin in the front for the driver and can have an open or enclosed cargo compartment in the rear for transporting goods.

Generally, these vehicles come in various sizes and configurations, and they play a crucial role in last-mile logistics and small-scale transportation needs in densely populated areas. They are commonly used for delivering goods, such as groceries, small packages, and other items within local communities.

These mini tricycle pickups are available in a variety of sizes. The least expensive ones are small open-cabin single-seat vehicles with motorcycle handlebars, hand-crank start, and

a three-speed transmission, costing around USD300. The most sophisticated mini pickup has a closed, car-like cabin with a steering wheel and radio/cassette player, electric start, a dumping capability for the cargo bed, and a low-range gearbox that complements the standard three-speed transmission. Between these extremes are vehicles with almost every conceivable combination of features.

Most tricycle pickups have the following attributes:

- one-cylinder diesel engine
- 12 to 15 horsepower
- evaporative water-cooling (no water pump)
- belt drive from the engine to the transmission, mounted on the rear axle
- payload capacity of 500 kg
- top speed of 50 km/hr (specified by law)

Advantages of owning a tricycle pickup

Tricycle pickups are generally the preferred choice for transporting goods for relatively short distances. They have the following advantages:

Tricycles observed in other Asian countries



Photo 12. A fleet of passenger tricycles lining up at Jakarta MRT station for passengers.



Photo13: The above passenger tricycles used in Bangladesh are either powered by LPG or battery. (Photo courtesy of Ar Dr Goh Ai Tee).

Tricycles are also commonly used in other Asian countries, mainly to ferry passengers for an affordable fee. Such passenger tricycles are very basic in fabrication, unattractive but functional.

1. Suited to poor road conditions. Rural roads are not well suited to conventional low-ground-clearance vehicles, and high-speed vehicles have little advantage for short trips on bad roads. Tricycle pickup's ground clearance is normally greater than 180mm.
2. Low price. A half-ton tricycle pickup costs about half as much as a half-ton conventional truck.
3. Easy to maintain. While tricycle pickups may break down frequently, they do not require expensive parts or specialised repair skills.
4. Easy to drive. Tricycle pickup drivers do not need much training and as such the driving license is cheaper and easier to obtain than for conventional cars and trucks.
5. More comfortable and faster than farm tractors. Tricycle pickups are intermediate between farm tractors and conventional trucks in comfort and speed.

6. Lower fees and taxes than trucks. Tricycle pickups are subject to lower taxes and fees than trucks, though the amount varies greatly.

Economies of Scale

The fact that China has a huge number of farmers in rural areas has resulted in the lower cost of production of tricycle pickups for multiple uses in terms of purchase price, operation and maintenance cost. In 2021, the Wuling Hongguang MINIEV was the best-selling car model in China, with a sales volume of 426,480 units. The Volkswagen Lavida was the second best-selling model with sales of approximately 391,360 units that year. Tricycle pickup prices range from USD300 onwards for small open-cabin single-seat vehicles with motorcycle handlebars, hand-crank starting, and a three-speed transmission. ■



Tram negotiating the narrow Lisbon streets between two buildings



Iconic Lisbon Tram

By Ngam Su May

On my first trip to Lisbon, capital of Portugal, in September 2023, I took a ride on one of its iconic trams. It was indeed memorable, travelling in a century-old tram that can navigate narrow and steep streets. The tram is part of an extensive and diverse public transport network in Lisbon. Metro Lisbon, with a population of around three million, is well served by other modes of transport such as buses, metro, funiculars and elevators.

I was recommended to take Tram 28 (out of six tram lines) as it is said to be the most famous but

packed with tourists. As a cost-saver, I purchased a 24-hour public transport card called *navegante* for €6.60 which includes rides on all trams, metro and buses. If using cash, the ticket price is €3 per trip. The tram service is operated by a company called *Companhia Carris de Ferro de Lisboa* (Carris) .

I first took Tram 24 which was located near my hotel to the city centre to catch Tram 28. The Tram 28 route called E28 stretches 7 km from *Martin Moniz* to *Campo Ourique*. This is considered the classic tram route that passes *Alfama*, *Baixa* and *Chiado* districts. It connects the eastern and western sides of central Lisbon.

After jostling with some tourists, I boarded the iconic yellow electric carriages of Tram 28. The carriage looks old but is well preserved with wooden floors and timber window frames. Its body is painted yellow, commercialised with some advertising images. On board, I noticed modern facilities namely the card swiping machine and the red button for passengers to push when they want to alight.

It was standing room only but I was lucky to get a seat about 10 minutes later. As the tram chugged along, I realised that the Lisbon tram is an old technical marvel. The tram, powered by 600v DC overhead lines, rattled and screeched as it moved on two axles with a wheel base of 1.9m, along a narrow track gauge of just 900mm. What is more outstanding is that the tram negotiated



Writer at a Lisbon tram stop



Tram driver at the control panel (Wikimedia Commons)

the meandering, narrow and steep streets of Lisbon. In some areas, I saw the tram passing inches away from the side of buildings. According to www.knorr-bremse.com, the Lisbon tram can take curves with radii under 10m and negotiate gradients up to 13.5%, making it a world record for trams.

I was amazed by the extreme skill and patience of the tram drivers (there were two of them on shifts – one man and one woman). They control the tram as it plied the single track shared with cars and buses and observed the traffic lights along the way. They steered carefully and used the horn to warn absent-minded pedestrians walking close to the tracks. I noticed the noisy braking system as it is triggered by long metallic handle pulled by the driver's hand. The drivers also use numerous controls in the front panel to manoeuvre the tram. At one tram stop, the male driver got up from his seat to collect cash and return change to a lady passenger.



The narrow tracks and scenery along the tram route

Further down the line, the driver had to get down the tram because a car was parked in the middle of the track. It took a while to get the car out of the way.

On the tram route, I saw the picturesque parts of the historical town. Lisbon is one of the oldest cities in Europe with a rich history of kings, empires, discoveries, tragedies and rebuilding.

Because of the crowd, it was difficult to take photos. From the window, I was enthralled by the many grand buildings and their various classical styles. These reflect Portugal's history through the ages — Romanesque, Gothic, Manueline, Baroque and others. Many heritage buildings are adorned with pastel-hued facades, ornate balconies and intricate *azulejos* (tiles).

It was a long journey of almost one hour, passing 36 stops through the beautiful old quarters of the city. I enjoyed the slow-paced but scenic tram ride. It appears that tourists like me,

is one of the reasons why trams still run in Lisbon. The city was reported to receive 5.4 million tourists in 2022. Tourists obviously enjoy this nostalgic way of exploring the city. It is touted as a 'must-do' when in Lisbon. The other reason is Lisbon's topography. Its landscape is irregular, dominated by hills and valleys. Inner city streets are also narrow with meandering cobbled pavements. So, the small trams are ideal to transverse many districts.

It is a wonder that the Lisbon tram has endured for more than 100 years. The first tram service started in 1873, using horses and then steam power, before turning electric in 1901. At its height, the tram network grew to 27 lines. It declined with the expansion of buses and the construction of the Lisbon Metro lines. But six tram lines still remain today, with 63 trams in operation covering about 31km. I am glad to have experienced a part of this unique heritage. ■

Getting Started with ESG

By Lee Soo Leng

The Global ESG Monitor (GEM), a research initiative that examines ESG transparency in non-financial reporting of the largest companies in the world, revealed that Malaysian companies used internationally recognised frameworks, standards, and strategic tools in their Environmental, Social and Governance (ESG) reporting but lacked the appropriate content and level of detail needed for optimal transparency, thus ranking them in the midfield amongst global and regional peers.

Benefits of a strong ESG programme in companies

Some key benefits of implementing ESG programmes in companies are:

- **Improved transparency and trust**
By disclosing detailed information about their ESG performance, companies demonstrate commitment to transparency, which helps build stakeholder trust. This can be particularly important in the modern business environment where investors, customers, partners, employees, and others increasingly demand sustainable and ethical corporate behaviour.
- **Decreased costs**
A strong ESG programme can decrease expenses. Examples include lower costs in operations, e.g., energy, water, materials, and waste; in human resources (HR), e.g., higher productivity and easier talent attraction, avoiding non-compliance penalties, more accessible access to capital, etc.
- **Stronger competitive advantage**
Investors are likelier to invest in companies that disclose their ESG performance. Partners and customers are increasingly looking for

responsible companies to do business with. Employees want to work for and stay with companies committed to building a positive impact on people and planet.

- **Better risk management**

Preparing ESG programmes will help companies identify and manage potential risks and opportunities. For example, a company that discloses information about its carbon emissions may be able to identify opportunities to reduce those emissions, mitigate the associated risks, and lower costs.

Start with Materiality Report

All ESG reporting and changes start with the understanding of the concept of materiality. As explained, stakeholders and investors are inquiring about companies' dedication to sustainability initiatives and other activities that fall under the ESG umbrella. It's essential to have answers to these questions.

A materiality assessment provides a guide or blueprint for an organisation's ESG strategy. It empowers companies to easily report on the current state and outline future initiatives while considering business goals and risks. Companies use the concept of materiality to guide their sustainability strategic planning processes. There is no one way to conduct a materiality assessment. Many companies rely on external consultants to help them, while other companies with more robust sustainability teams manage the process themselves.

Generally, the process for conducting a materiality assessment includes the following steps:

1. **Identify and categorise the key issues.** In this phase, the company should develop a long list of issues. The various problems

that could be classified under sustainability can make it very hard for a company to address and manage them. For this reason, a company should identify and prioritise the issues that are most material to its business and most relevant to its stakeholders.

2. **Collect data from internal and external stakeholders.** Internal stakeholders should include critical managers and business leaders, while external stakeholders should cover significant actors outside of the company, including business partners, community representatives, and NGOs. They should all be asked to weigh a list of issues by their relative importance.
3. **Map and prioritise the issues.** In this step, all of the data collected from internal and external stakeholders is put into a model or framework and transformed into a quantitative score that can be used to map and prioritise issues.
4. **Align the issues with management and business vision.** Once the data is collected, it can be integrated into business strategies and risk assessments.
5. **Reporting on progress.** Most companies publish annual sustainability reports to report on progress. These reports generally refer back to the materiality matrix and the sustainability strategy and provide an update on key metrics and targets.

Overview of Reporting Frameworks

Companies use several key frameworks to develop an understanding of the critical materiality issues they should consider and report on. The frameworks each have a different purpose, audience, and articulation of the materiality concept.

Companies' materiality assessment will help pinpoint which frameworks, goals, strategies, and portfolios align well. Several of these frameworks require similar data and information that, once identified, can be easily repurposed for additional reporting processes.

ESG Strategy

Companies should look to incorporate various ESG trends, practices and ideas into their plans. Some examples include reducing greenhouse gas emissions, creating more responsible and sustainable supply chains, implementing climate adaptation measures and adopting a circular economy model, which aims to reuse product components and materials instead of throwing them away or recycling them.

With such considerations in mind, here are eight steps to take in developing and implementing an ESG strategy:-

1. **Get input from internal and external stakeholders.** Consult with board members and business executives about ESG issues that are important to the business, and talk to various other stakeholders -- employees, institutional investors, customers, suppliers, community leaders -- about ones that matter to them.
2. **Assess the materiality of different ESG issues.** Use the input you've gathered to identify the issues that are most important to both the business and stakeholders, as well as the issues that are less important to either party or to both. The individual elements of the ESG strategy can then be prioritised based on that assessment.
3. **Establish a baseline on ESG performance.** Document current performance levels, policies, practices and statistics on the ESG factors that will be addressed as part of the strategy. Doing so provides a starting point for future comparisons to evaluate the progress of ESG efforts.
4. **Define measurable goals for ESG initiatives.** This involves setting objectives and performance targets for the ESG strategy as a whole and the various pieces of it. Some of these goals might include desired improvements on KPIs, while others might call for maintaining current performance levels and practices that already meet requirements.
5. **Create a deployment roadmap.** Next, build a detailed implementation plan for the ESG programme with project timelines, milestones and responsibilities.



Numerous ESG reporting options are available to companies

6. **Choose the reporting standards and frameworks to use.** Numerous ESG reporting options are available to companies. Many businesses use more than one to meet different reporting and disclosure requirements. Choosing the right framework or combination of them is a key part of developing a successful ESG strategy.
7. **Collect, analyse and report on ESG data.** Once the ESG programme is operational, processes are needed to collect and analyse data on the relevant KPIs and then to prepare reports for stakeholders. Full reports typically are done on an annual basis, but internal progress updates for the board and senior management are more frequent.
8. **Review and revise the strategy as needed.** ESG requirements can change as business needs, stakeholder concerns and regulatory mandates evolve. An ESG strategy should be reassessed regularly to make sure it's still effective and to identify required updates -- including weak spots that need to be optimised.

has identified six dimensions that make up a transparent report:

- **Balance:** The extent to which the reporting mentions positive and negative aspects, as well as risks and opportunities.
- **Comparability:** Assess if the reporting was aligned with frameworks and standards such as the Global Reporting Initiative, as well as provision of metrics, formulas and comparisons.
- **Accuracy:** Information on indicators, topics (qualitative) and delivering concrete information and methodology.
- **Timeliness:** Information on concretely set time horizons and a clearly stated reporting period.
- **Reliability:** The extent to which the reporting is externally audited; clear responsibilities or accountabilities and monitoring are defined.
- **Relevance:** The report being material according to stakeholders' needs and delivering ESG context, with a glossary.

GEM commented that those that deeply engage with ESG issues and pursue sustainable development can benefit in the long term – a better reputation, higher customer loyalty, increased employee engagement and reduced risk of negative impacts on the environment and society. ■

Strive to be Transparent in ESG Reporting

GEM as an independent research initiative dedicated to investigating ESG transparency

REFERENCE

UNDP, TechTarget, Perspective Strategies, STAR

Social and Governance Elements under ESG

By Lim Tau Wee

The importance of ESG is being increasingly felt and practised by firms around the world especially the trading nations. But out of all three letters in the acronym of ESG, the “G” is often overlooked, because it is viewed as not “directly” linked to sustainability or often not associated with environmental and social “good deeds.” The “G” component was necessary in order to support the “E” and “S.” Plus, it’s practically mandatory for building up long-term, sustainable value, or even for general business compliance.

Similarly, “S” pertains to a company’s societal influence and risks, encompassing employee welfare, human rights, and community engagement. Prioritising social responsibility in business builds positive relationships and societal contributions.

BACKGROUND OF ESG

The early days of ESG can be traced back to the 1960s and 1970s, when socially responsible investing (SRI) began to gain popularity. SRI involves selecting investments based on a company’s social or environmental impact, as well as its financial performance.

A 2004 report from the United Nations — titled *Who Cares Wins* — carried what is widely considered the first mainstream mention of ESG in the modern context. This report leaned in heavily, encouraging all business stakeholders to embrace ESG long-term. The rapid growth of ESG investing can be attributed to various factors, including increased awareness of global sustainability challenges, heightened regulatory scrutiny, and the recognition that ESG factors can materially impact financial performance.

‘Socially conscious’ investors around this time were largely focused on topics such as human

rights and pollution; the idea that there could be a link between ESG and financial performance was just emerging. However, the term ESG did not come into use until 2005. Yet, ESG has always included business objectives while striving to make the world a better place. Since that time, the terms ESG, CSR, and sustainability have been used interchangeably by companies.

ESG issues were first mentioned in the 2006 United Nations Principles for Responsible Investment (PRI) report consisting of the Freshfield Report and *Who Cares Wins*. ESG criteria was, for the first time, required to be incorporated in the financial evaluations of companies. This effort was focused on further developing sustainable investments. At the time, 63 investment companies composed of asset owners, asset managers and service providers signed with USD6.5 trillion in assets under management (AUM) incorporating ESG issues. As of June 2019, there are 2,450 signatories representing over USD80 trillion in AUM.

The objective of the report was on the integration of environmental, social and governance issues into investment policy (including asset allocation, portfolio construction and stock-picking or bond-picking) voluntarily permitted, legally required or hampered by law and regulation; primarily as regards public and private pension funds, secondarily as regards insurance company reserves and mutual funds.

Like many professional activities, investment decision-making is an art rather than a science: there is no formula that guarantees a particular outcome. It is important to distinguish therefore between optimal decision-making and optimal decisions. The law is concerned with the former, as the latter can be arrived at only with hindsight. The oft-repeated caveat that ‘past returns are no indication of future performance’ is reflected in

“ Volkswagen’s emissions tests scandal, Facebook’s misuse of data and other recent incidents have caused significant financial damage to these companies.

the legal duties imposed on investment decision-makers.

As public awareness of the environmental and social impacts of corporate activity has grown, the attitude of capital markets to ESG investment appears also to have evolved. As a result, investment with regard to ESG performance is becoming increasingly mainstream. A 2005 survey of 195 fund managers from around the world by Mercer Investment Consulting revealed that the use of positive screening for environmental, social and ethical factors is entering mainstream investment analysis particularly where such screening may potentially yield superior financial performance by targeting companies that adopt socially responsible practices and thereby avoid future liabilities and losses. The study revealed that 70% of fund managers believe the integration of environmental, social and ethical factors into investment analysis will become a mainstream part of investment management

The “G” in ESG refers to the governance factors of decision-making, from sovereigns’ policymaking to the distribution of rights and responsibilities among different participants in corporations, including the Board of Directors, managers, shareholders, and stakeholders.

The purpose of the corporation, the role and makeup of the Board of Directors, and the compensation and oversight of top executives have emerged as core issues in companies’ corporate governance structures.

When analysing environmental, social, and governance factors, the “G” element is often forgotten amid considerations over climate risk, societal implications and other “E” and “S” risks

and opportunities. However, understanding governance risks and opportunities in decision-making is critical, as poor corporate governance practices have stood at the core of some of the biggest corporate scandals.

Volkswagen’s emissions tests scandal, Facebook’s misuse of data and other recent incidents have caused significant financial damage to these companies. In the face of companies’ missteps and expanding awareness of global diversity and income inequality, corporate governance is a core component of ESG.

THE “G” FACTOR

The “G” in ESG pertains to the governance factors of decision-making, from sovereigns’ policy making to the distribution of rights and responsibilities among different participants in corporations, including the Board of directors, managers, shareholders and stakeholders. Governance factors indicate the rules and procedures for countries and corporations, and allow investors to screen for appropriate governance practices as they would for environmental and social factors. A corporation’s purpose, the role and makeup of the Board of Directors, shareholder rights and how corporate performance is measured are core elements of corporate governance structures.

S&P Global research on governance factors has shown that companies that rank well below average on good governance characteristics are particularly prone to mismanagement and risk their ability to capitalise on business opportunities

over time. S&P Global assesses companies' governance performance by assessing four factors: structure and oversight, code and values, transparency and reporting, and cyber risk and systems.

Gender diversity and equity is another high-profile governance issue, with many institutional shareholders demanding better representation of women on corporate Boards and in executive ranks, and equal compensation and mobility for women and people of colour. More companies are emphasising the financial benefit of creating inclusive workplaces in an effort to increase diversity and inclusivity. S&P Global Market Intelligence research revealed that firms with more women on their Board of Directors had greater financial performance than less diverse companies.

Understanding the “G” in ESG is critical, as governance risks and opportunities will likely increase as social, political, and cultural attitudes continue to evolve. S&P Global evaluates governance factors in all of its ESG Solution offerings. Notably, in addition to determining whether the entity is actively and effectively managing its exposure to governance risks and opportunities, the S&P Global Ratings ESG Evaluation weighs potential environmental and social risks to determine an entity's capacity to operate successfully.

The World Bank considers governance as a crucial element within the ESG framework. ESG factors are used to assess the sustainability and ethical impact of an investment in a company or project.

In terms of governance, the World Bank emphasises good governance practices as essential for sustainable development. This includes transparent and accountable decision-making, effective institutions, rule of law, and the protection of human rights. The World Bank recognises that sound governance is vital for attracting investment, fostering economic growth, and achieving positive social and environmental outcomes.

The World Bank has various initiatives and programmes that promote good governance practices globally. These efforts aim to strengthen institutions, enhance transparency, and combat corruption, all of which contribute to a more sustainable and equitable development.

It's important to note that ESG considerations have become increasingly important in the financial and investment sectors, and organisations like the World Bank play a role in encouraging responsible and sustainable practices in the global economy.

KEY ELEMENTS OF “G” IN ESG

With “G” or Governance under ESG referring to the governance practices a company employs to ensure ethical and responsible decision-making, some key aspects of governance under ESG are as follows:

- **Board Structure and Independence:** Companies with strong governance under ESG typically have a well-structured Board with a sufficient number of independent directors. This helps ensure that decisions are made in the best interest of the company and its stakeholders.
- **Executive Compensation:** ESG governance includes considerations about fair and transparent executive compensation. Companies that align executive pay with ESG performance indicators are seen as more responsible and sustainable.
- **Shareholder Rights:** Companies promoting good governance under ESG often prioritise shareholder rights, ensuring that shareholders have the ability to influence important decisions through voting mechanisms.
- **Ethical Business Practices:** Governance under ESG involves promoting ethical business practices, including anti-corruption measures, transparency, and accountability.
- **Risk Management:** Effective risk management is a crucial component of ESG governance. Companies need to identify and manage risks related to environmental, social, and governance issues to ensure long-term sustainability.
- **Stakeholder Engagement:** Companies with strong ESG governance actively engage with and consider the interests of various stakeholders, including employees, customers, and the community.
- **Disclosure and Transparency:** Transparency is key to ESG governance. Companies are expected to disclose relevant information

regarding their ESG performance, enabling stakeholders to make informed decisions.

- **Compliance with Regulations:** Adherence to applicable laws and regulations is fundamental to governance under ESG. Companies need to comply with environmental, social, and governance laws and standards.

Overall, governance under ESG emphasises responsible and sustainable business practices that take into account the broader impact of the company on the environment, society, and its own internal structures. This approach is increasingly important for investors and stakeholders seeking to support businesses that prioritise ethical and sustainable practices.

THE “S” FACTOR

Social aspects under ESG cover a range of issues related to human rights, labour standards, community engagement, and social inclusion. The World Bank recognises that social sustainability is crucial for the success and impact of development projects.

Addressing social issues under ESG considerations involves focusing on the social impact and responsibilities of a company. Here's how companies can tackle social issues under the ESG framework:

- **Diversity and Inclusion:** Promoting diversity and inclusion within the workforce is a crucial aspect. Companies should aim to create a workplace that is representative of different demographics, fostering an inclusive culture.
- **Labour Practices:** Fair labour practices are vital. This includes ensuring fair wages, safe working conditions, and respecting workers' rights. Companies should also address issues related to child labour and forced labour.
- **Community Engagement:** Engaging with local communities positively is essential. This may involve philanthropy, community development projects, and being mindful of the social impact of the company's operations on local communities.
- **Human Rights:** Companies should uphold and respect human rights standards, both

within their operations and in their supply chains. This includes avoiding complicity in human rights abuses.

- **Customer Relations:** Ensuring fair and transparent business practices in dealing with customers is crucial. This involves providing accurate information, fair pricing, and addressing customer concerns responsibly.
- **Product Safety and Quality:** Ensuring the safety and quality of products is part of social responsibility. Companies should prioritise producing goods and services that meet ethical standards and pose no harm to consumers.
- **Employee Well-being:** Beyond fair wages, companies should focus on the overall well-being of their employees. This includes providing benefits, promoting work-life balance, and addressing mental health concerns.
- **Supply Chain Responsibility:** Assessing and managing social risks within the supply chain is crucial. Companies should strive to ensure that their suppliers adhere to ethical and socially responsible practices.
- **Stakeholder Engagement:** Regular communication with various stakeholders, including employees, customers, investors, and the broader community, helps in understanding and addressing social concerns effectively.
- **Transparency and Reporting:** Companies should be transparent about their social impact and efforts to address social issues. Regular ESG reporting can help stakeholders assess a company's commitment to social responsibility.

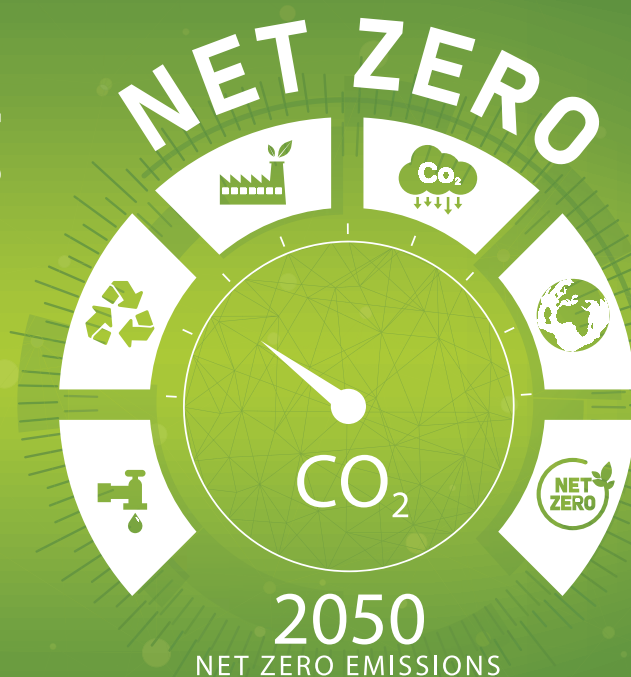
The ‘S’ in ESG is also about Socially Responsible Investing (SRI) which is an investment strategy that highlights this one facet of ESG. SRI investors seek companies that promote ethical and socially conscious themes including diversity, inclusion, community-focus, social justice, and corporate ethics, in addition to fighting against racial, gender and sexual discrimination. ■

REFERENCE

UNEP, TechTarget, Forbes, World Bank

Challenges to Achieving Carbon Neutrality

By Cheo Hong Keyong



The international common goal to achieve carbon neutrality taking cognisance of the Climate Change threat to the environment has prompted several organisations to work towards promoting carbon neutrality and addressing climate change. Among the key notable entities are:

United Nations (UN): The UN plays a crucial role in promoting global efforts to address climate change. The Paris Agreement, adopted in 2015 under the UN Framework Convention on Climate Change (UNFCCC), aims to limit global warming and achieve carbon neutrality.

Inter-Governmental Panel on Climate Change (IPCC): The IPCC is a scientific body under the UN that assesses the scientific knowledge on climate change. While it doesn't champion carbon neutrality directly, its reports contribute to the global understanding of climate change, which influences policies promoting carbon neutrality.

European Union (EU): The EU has set ambitious targets to achieve carbon neutrality by 2050. The European Green Deal is a comprehensive plan outlining the EU's commitment to sustainability and reducing greenhouse gas emissions.

Non-Governmental Organisations (NGOs): Various NGOs, such as Greenpeace, World Wildlife

Fund (WWF), and others, actively work to promote carbon neutrality and advocate for policies to combat climate change.

Action by UN Environment

Carbon neutrality, or having a net-zero carbon footprint, refers to achieving net-zero carbon emissions by balancing a measured amount of carbon released with an equivalent amount sequestered or offset.

Carbon dioxide emissions account for 82% of global warming, with the rest coming mainly from the much more potent greenhouse gases, methane and nitrous oxide.

A November 2018 report by the World Meteorological Organisation of the United Nations showed that globally averaged concentrations of carbon dioxide reached 405.5 parts per million (ppm) in 2017, up from 403.3 ppm in 2016 and 400.1 ppm in 2015. Concentrations of methane and nitrous oxide also rose, while there was a resurgence of a potent greenhouse gas and ozone-depleting substance called CFC-11, which is regulated under an international agreement to protect the ozone layer.

UN Environment has achieved climate neutrality largely thanks to an offset programme based on the mitigation and purchase of Certificates of Emission Reduction from projects, mainly in Asia, certified by the UN Framework Convention on Climate Change. This, coupled with a 35% net reduction in its climate footprint has ensured continuous climate neutrality for a decade.

Challenges to achieving Carbon Neutrality

Achieving carbon neutrality poses several challenges, and they vary across different sectors and regions. The common challenges associated with meeting carbon neutrality are as follows:

Technological Challenges: Developing and deploying carbon-neutral technologies on a large scale is a significant hurdle. This includes renewable energy sources, carbon capture and storage, and sustainable transportation solutions.

Economic Impacts: Transitioning to carbon neutrality often requires significant upfront investments. Businesses and industries may face economic challenges in adopting cleaner technologies and practices, especially if there are competing cheaper, but carbon-intensive alternatives.

Policy and Regulatory Barriers: Inconsistent or insufficient policies and regulations can hinder progress. A lack of clear guidelines or incentives may discourage businesses from investing in carbon-neutral initiatives.

Infrastructure Requirements: The shift to carbon-neutral energy sources requires a robust and adaptable infrastructure. This includes updating power grids, building charging infrastructure for electric vehicles, and transitioning industries to more sustainable processes.

Global Co-operation: Carbon emissions are a global issue, and achieving carbon neutrality requires international collaboration. Co-ordinating efforts among nations with varying levels of development and priorities can be challenging.

Public Awareness and Engagement: Achieving carbon neutrality often involves changing consumer behaviour. Educating the public

about the importance of sustainable practices and encouraging behavioural changes can be a complex task.

Technological and Knowledge Gaps: In some cases, there may be gaps in knowledge or technology needed for certain sectors to achieve carbon neutrality. Research and development are crucial to fill these gaps.

Transitioning Workforce: Shifting to carbon-neutral practices may impact jobs in certain industries. There is a need for strategies to retrain and transition the workforce towards new, sustainable employment opportunities.

Carbon Offsetting Concerns: Relying too heavily on carbon offsetting mechanisms without addressing the root causes of emissions can be controversial. Genuine efforts to reduce emissions should be prioritised over offsetting strategies.

Resilience to Climate Change: While the goal is to mitigate climate change, it is also important to build resilience to its inevitable impacts. Adapting to changing climate conditions is a challenge that needs consideration.

Addressing these challenges requires a comprehensive and collaborative approach involving Governments, businesses, communities, and individuals.

ASEAN Readiness for CCT and CCU Technologies

Towards Carbon Neutrality

ASEAN's energy landscape depends on coal and this remains imperative, particularly in the electricity and industry sectors. To address the increasing energy demand in ASEAN in 2050, the region is predicted to still rely on fossil fuels despite its increasing renewable energy share. Oil and coal are expected to account for 62% of the total energy supply of ASEAN in 2050. The coal used in power generation in 2050 is projected to account for 44% of its total energy consumption.

Most ASEAN countries have become major players in the global coal market, both as exporters and importers, even though the trade balance of coal in ASEAN is a surplus in 2021. It indicates that ASEAN still relies on fossil fuels for energy despite its unconditional or conditional commitment



ASEAN countries are projected to still use carbon in power generation in 2050.

under the current national and foreign policies on the climate-energy nexus, such as the Enhanced Nationally Determined Contribution (ENDC) and Global Coal to Clean Power Transition Statement (GCCPS).

Based on the current trends and projections, Coal Fired Power Plants (CFPP) will remain operational even during the energy transition, serving as stable supply sources and balancing sources through flexible operation until energy storage technology fully blooms and becomes affordable. Therefore, Clean Coal Technology (CCT) and/or Clean Coal Utilisation (CCU) is the optimal solution to achieve carbon neutrality while ensuring energy security during the transition. ASEAN could employ this type of technology to use coal power in the cleanest possible manner.

Since the possibility of introducing new coal-fired power plants is slim globally, the practice of CCT and CCU should be introduced as “add-ons” to existing power plants, namely (1) air quality control system and (2) technology for flexibility and balancing. In ASEAN, ongoing projects with CCU technologies can be found in the use of biomass, hydrogen, and ammonia, CCS projects and energy storage. Moreover, there are several best practices

from other countries that apply technologies that modify the plant, such as biomass co-firing by mixing the ratio up to 50% and dedicated firing with diverse types and plant scale, ammonia co-firing and green ammonia production, hydrogen utilisation, supply chain of carbon-neutral fuels, and CCU technology.

By assessing the CCT and CCU deployment in the region, ASEAN member states (AMS) still face bottlenecks. There is a lack of commercial business models in the feasibility stage due to high business risks followed by share and transfer financial risk and public acceptance. Meanwhile, there are technical failures and policies and regulations during the deployment. Thus, a survey with ASEAN focal points on technology readiness and acceptance was conducted. Based on the online survey, most countries have common challenges in technology procurement for carbon neutrality and energy transition: technical, financial costs, and enabling policy and regulatory framework. In addition, land acquisition and geographical constraints pose a significant threat.

Therefore, to accelerate the CCT and CCU technologies in the supporting carbon neutrality targets of the region, the following actions are

well-designed for the introduction and deployment of CCT and CCU technologies:

1. enabling policies within each AMS to support market conditions and institutional frameworks;
2. inclusion of knowledge sharing and enhancing capacity building at the policy preparation phase and project implementation and large deployment of these technologies;
3. diversification of the available CCT and CCU technologies based on the country's needs;
4. creating greater access for finance or investment to be economically viable. Among others, carbon pricing (tax and credit) could serve as an important instrument with the potential to support and encourage private sector engagement also value chain establishment that would bolster the growth and resource enhancement in the region;
5. implementation of other supporting measures and cross-sectoral interlinkages such as integrating sustainable land use into existing energy and investment policy, and
6. redesigning and strengthening the industrial hub would enable the region to share the required infrastructure of the CCT and CCU technologies, reducing cost, and ensuring the availability of key elements needed for these technologies.

Enhancing global efforts to strengthen resilience under COP 28

In a major step forward, COP 28 agreed on targets for the Global Goal on Adaptation (GGA) and its framework, which identifies where the world needs to get to in order to be resilient to the impacts of a changing climate and to assess countries' efforts.

The GGA framework reflects a global consensus on adaptation targets and covers the themes of water, food, health, ecosystems, infrastructure, poverty eradication and cultural heritage.

The decision gives adaptation progress a future orientation for the first time, reflecting aspiration

and ambition, as opposed to the previous practice of measurement against past efforts.

While adaptation efforts are more difficult to quantify (unlike the efforts to reduce greenhouse gas emissions) and are very specific to the locations and geographies of implementation, the GGA aims to guide adaptation planning and strategies at all levels and to align the finance, technology and capacity-building support needed to achieve these.

Climate finance took centre stage at the conference and was called the "great enabler of climate action."

The Green Climate Fund (GCF) received a boost to its second replenishment with six countries pledging new funding at COP28 with total pledges now standing at a record USD 12.8 billion from 31 countries, with further contributions expected.

Conclusion

Mitigating climate change requires concerted efforts for global co-operation, sustained efforts, and innovative solutions. Climate scientists, policymakers, and experts commonly stress the importance of reducing greenhouse gas emissions, transitioning to renewable energy sources, and implementing nature-based solutions. The significance of international agreements, such as the Paris Agreement, as highlighted, along with the role of individuals, businesses, and Governments is crucial in contributing to a sustainable future. The need for adaptation strategies to address the inevitable impacts of climate change should be emphasised. There is a need for a range of solutions, including access to technology and early warning systems for disaster management, and enhanced stakeholder capacities at all levels. The role of good governance and incorporation of lessons learned from indigenous knowledge are also recognised.

Overall, a collective and co-ordinated approach is seen as crucial to effectively mitigate the impacts of climate change and build a resilient and sustainable planet for future generations. ■

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UNCC, UN Environment, ASEAN Centre for Energy

What Others Say About Environmental, Social, Governance

By Samniang Saenram

The Malaysian Budget 2024 reflects the Government's recognition towards ESG as a "need" today, and a whole-of-nation approach to make Malaysia an investment destination and achieve carbon neutrality by 2050. Budget 2024 also demonstrates Malaysia's commitment to embracing ESG principles and its potential to attract sustainable investments while highlighting the need for broader and more comprehensive ESG strategies for the future.

About ESG (World Economic Forum)

The critical thing to understand about ESG is that it is a strategic concern of businesses, not just a nice-to-have activity that occasionally pops up on a C-suite agenda. A business' long-term survivability depends on a broad range of factors, just as it depends on the business's ability to master the digital economy. In fact, a company's medium-term (and even short-term) success in our fast-paced environment depends on making good decisions around environmental and social considerations. For this reason, focus has shifted from just doing good—what we call corporate social responsibility (CSR)—to setting up governance processes to build these activities into the fabric of the corporation's activities. ESG is CSR raised to a strategic priority, bringing transparency and accountability into the company's environmental and social impacts.

Why ESG Is an Important Board Concern

According to a Fortune 500 company board member, "companies are recognising that taking care of broader stakeholders in the business over

the mid- to long-term is a good thing for the long-term sustainability of the business." Some 45% of board directors now say that ESG is a regular part of the board's agenda (up from 34% in 2019). In addition, 82% rank being a fair employer and good corporate citizen as "extremely" or "very" important. Environmental and social governance directly affects business performance: companies on the S&P 500 ESG Index outperformed, suffered fewer losses, and recovered faster than the S&P 500 during the pandemic.

Environmental and Social Standards (World Bank)

The ten Environmental and Social Standards (ESSs) are part of the Environmental and Social Framework (ESF) that supports green, resilient and inclusive development by strengthening protection for people and the environment; and making important advances in areas such as labour, inclusion and non-discrimination, gender, climate change, biodiversity, community health and safety, and stakeholder engagement.

ESS1: Assessment and Management of Environmental and Social Risks and Impacts sets out the Borrower's responsibilities for assessing, managing and monitoring environmental, social risks and impacts associated with each stage of a project.

ESS2: Labour and Working Conditions recognises the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth.

ESS3: Resource Efficiency and Pollution Prevention and Management recognises that

economic activity and urbanisation often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle.

ESS4: Community Health and Safety addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimise such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement - involuntary resettlement should be avoided.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources recognises that protecting and conserving biodiversity and sustainably managing living natural resources are fundamental to sustainable development and it recognises the importance of maintaining core ecological functions of habitats, including forests, and the biodiversity they support.

ESS7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities ensures that the development process fosters full respect for the human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods of Indigenous peoples.

ESS8: Cultural Heritage recognises that cultural heritage provides continuity in tangible and intangible forms between the past, present and future. ESS8 sets out measures designed to protect cultural heritage throughout the project life-cycle.

ESS9: Financial Intermediaries (FIs) recognises that strong domestic capital and financial markets and access to finance are important for economic development, growth and poverty reduction.

ESS10: Stakeholder Engagement and Information Disclosure recognises the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of

projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

UN Environment's Green Economy Initiative (United Nations)

United Nations Environment launched the Green Economy Initiative (GEI) in 2008, which consisted of global research and country-level assistance encouraging policymakers to support environmental investments within the context of sustainable development. Thanks to this initiative and the work of other agencies, "green economy in the context of sustainable development and poverty eradication" was placed on the 2012 Rio+20 agenda and was acknowledged as a tool for achieving sustainable development.

UN Environment has developed a working definition of a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

Over the past decade, the concept of the Green Economy has emerged as a strategic priority for many Governments and inter-Governmental organisations. All told, 65 countries have embarked on a path towards an Inclusive Green Economy and related strategies. By transforming their economies into drivers of sustainability, they will be primed to take on the major challenges of the 21st century - from urbanisation and resource scarcity to climate change and economic volatility.

From GEI to an Inclusive Green Economy

An Inclusive Green Economy (IGE) has evolved from earlier work on Green Economy. In its simplest expression, such an economy is low carbon, efficient and clean in production, but also inclusive in consumption and outcomes, based on sharing, circularity, collaboration, solidarity, resilience, opportunity, and interdependence. It is focused on expanding options and choices for national economies, using targeted and appropriate fiscal and social protection policies, and backed up by strong institutions that are specifically geared to safeguarding social and ecological floors. And it recognises that there

are many and diverse pathways to environmental sustainability.

ESG Ratings (*Organisation for Economic Co-operation and Development*)

The ESG financial ecosystem is evolving, including issuers and investors who disclose and use information related to environmental, social and Governance issues. Financial intermediaries, as well as Government and international organisation institutions are influencing the emerging practises in ESG investing. While constructive and inclusive progress has been made to develop ESG practices by several ESG players, it has generated the spread of a wide array of investment terminology, and disclosure frameworks which resulted in metric inconsistencies and lack of comparability for investors.

In this regard, while ESG methodologies are improving and becoming more transparent, scoring remains in a state of transition, with some rating providers still in the way of refining their methodology through the inclusion of factors such as materiality. There is a range of scoring methodologies in terms of determining which data to analyse and include, metrics weighting, materiality and how to consider missing information. Moreover, subjective judgment is layered particularly regarding absolute and relative scores within and across industries.

Even though progress has been made, a crucial point remains on the alignment with materiality factors. Different institutions, Global Reporting Institution (GRI) among others, are focusing on the assessment of materiality that is applied to different industries to determine the importance of each factor in the final ESG rating. This can depend on the business model, the external environment and the industry itself. The different materiality approaches have been influential in shaping the choice of key metrics used by the providers, but the discussion remains on the perspective on which metric is material.

When information from the issuers' disclosure is retrieved and different key factors are weighted the final ESG score can be computed. Nonetheless, ESG ratings can vary greatly from one ESG provider to another. The different methodologies used

to translate raw data into a more sophisticated rating suffer some level of criticism because of the wide variance in the results. This implies that if investors are using and relying on different service providers, the score inputs that shape securities selection and weighting could be driven by choice of rating provider. This section assesses the extent to which ESG scores of major providers differ, and also how they compare to the dispersion of credit ratings across firms.

The ESG score differences mentioned can occur for a number of reasons. They may relate to different frameworks, measures, key indicators and metrics, data use, qualitative judgement, and weighting of subcategories, reweighting of scores to ensure "best in class" in industries. While different methodologies, judgement and data are welcome to offer investors choice of approaches and outcomes, large differences in ESG ratings across providers may reduce the meaning of ESG portfolios that weight better-rated firms more highly.

ESG ratings can be used in a multitude of different investment approaches, which tend to conform to five distinct forms. On one side, the least amount of complexity is through excluding certain firms categorically (e.g. moral considerations), and on the other side is full ESG integration into the very firm culture of investing, such that it becomes an integrated part of the investment processes. Approaches such as ESG rebalancing, Thematic Focus and ESG Impact can be found in the middle. The choice of the strategy will greatly influence the final performance of the investment.

How can infrastructure projects enhance social value delivery (*New Civil Engineer*)

"When you see social value done well, when you can see it considered from the conception of a project through the design and delivery, there's something actually quite magical about how many lives that can impact," says Abby Reid from Taylor Woodrow.

An example of social value delivered by Taylor Woodrow was the construction of a 40m long cycle track as part of the Spalding Western Relief Road project to help children learn cycling skills.

“Powerful social value comes when a client and a contractor are able to work together on what’s appropriate to be delivered,” says AtkinsRéalis associate social value consultant Laura Hampson.

Enfield Council’s head of Meridian Water regeneration project Jenny Offord says that there should be collaboration between local authorities and contractors. Local authorities have an idea of what social value elements they want and contractors can advise on how to deliver it.

“To position additional social value on top of what we are already doing doesn’t work, so we need to find a way to embed it in our practices, which is something that we’re working towards.”

One of the challenges of embedding social value in projects is the lack of universal understanding of what social value is, according to social enterprise membership body Social Enterprise UK senior partnerships manager Nichola McAvoy.

A big issue is that there is no widely accepted way of measuring social value. “Different organisations are launching new tools,” Hampson says. “So, it’s quite difficult to measure apples with apples.”

There is not enough training, shared purpose and language in this space

The most widely used tool is the national themes, outcomes and measures (TOMs) framework. TOMs are a set of social value measures agreed by industry experts designed to maximise impact in five areas – jobs, growth, social, environment and innovation. While it can be useful, skills and training organisation, People Plus social value lead Craig Corrigan says it can often lead to contractors inputting social value measures that will yield the best TOMs score, rather than thinking about what would be most appropriate for the scheme.

We need clients to get comfortable with what social value is important to them and for them to direct us at the tender stage.”

Henderson suggests that clients should be given guidance about how to measure social value specific to their projects. McAvoy adds that an updated regulatory framework is required “so it’s super clear what it should mean and how it should be measured”.

What are most CFOs doing now in terms of ESG reporting (*Forbes*)

While many companies have been putting together ESG reports on their own for years, would you say that the new focus on it from the CFO’s office is moving the reporting more toward a mature and set process?

Its maturity process is on-going, but because of the disparate standards and disparate industry foci and different geographical needs, it will be a while. You’ll have a crystallized view on Europe before long, and we’ll have a good understanding of what clients are doing or what financial services entities are doing, because they’ll converge on commonality within their groups. But it’ll evolve, and it may evolve to the point where the three letters (ESG) aren’t used anymore, and it will simply be considered doing business. That’s when you’ll know.

In five to ten years, it may be considered more BAU (business as usual). If everyone’s doing it, and therefore it’s not a new and high-focus area, but it’s baked into the daily life and work of companies and their operations. That goes back to the context then. You have an understanding of strategy and stakeholders and data and governance and reporting, and therefore are focused on the operations.

What is ESG? (*Kearney Group*)

ESG is a world of corporate performance data that helps us account for the environmental, social and governance behaviour of a company or investment. It’s one of those terms that most recognise, but not everyone understands.

ESG reflects a company’s:

- **environmental** performance, like its carbon emissions and the amount of water used;
- **social** factors such as gender, race, diversity and inclusion; and
- **governance** factors such as corporate risk management, tax and reporting practices.

The term was first coined by the United Nations Environment Programme Finance Initiative in their October 2005 Fleschfields Report. These days, ESG integration is generally regarded as one of the basic building blocks of a sustainable investment strategy.



High quality ESG data and reporting are hard to come by

“ESG integration” is the systematic and explicit inclusion of environmental, social and governance performance data in an investor’s analysis and decision-making process. It provides a framework that helps us account for the externalities of a company or investment. And in turn, it gives us a more comprehensive picture of an investment’s real current and future value, and its risks. In this way, ESG factors are effectively our canary in the coal mine; highlighting leading companies, and helping us identify the laggards.

Today, ESG integration is central to sustainable investment strategies as it’s a powerful tool to de-risk portfolios and identify future performers, and thus, improve investment performance.

This makes intuitive sense when you consider the companies and management teams who are actively mitigating ESG risks and capturing ESG opportunities; they are, generally speaking, the highest quality and most skilled teams across the board.

Many great management teams have always actively managed key ESG issues. Doing so is just good business and reduces corporate risk. For example, reducing your company’s carbon

emissions not only helps mitigate climate change, it also reduces your cost base and your risk of future climate change-related litigation.

Other companies have simply chosen to ignore ESG performance or decided against disclosure, despite the overwhelming arguments in favour of doing so. For some, ESG has been regarded as more of a “greenwashing” communication issue, than a value-adding strategy.

As a result, high quality ESG data and reporting have been hard to come by. And, that which has been available is far from standardised, making it difficult to compare apples for apples, so to speak.

As investor interest in ESG has grown, however, so too has demand for data and ESG rated investments. So, we’re now seeing great improvements in the quality of reporting and global standards beginning to emerge. Consumer demand and the overwhelming evidence showing that strong ESG performance is linked to better investment results, has put management teams, Boards and financial markets on notice. ESG integration is here and it’s not going away any time soon. ■

Fenghuang - Tujia Stilted Building Construction

By Foo Mee Sim



Photo 1: Morning view of Fenghuang ancient townscape along Tuojiang river

The ancient town of Fenghuang is situated in the southwest region of Tujia-Miao Autonomous Prefecture of Xiangxi in Hunan province, China. Tujia and Miao are two of the 55 ethnic minority tribes of PR China. Built in 1704, this old town was given the title of the “National AAAA Tourist Attraction” for its charming scenery of ancient towers, bridges, streets, and other buildings as well as the rich culture of Miao, Tujia and 26 other minority ethnic groups.

Fenghuang boasts a long history and numerous cultural relics. It is home to two city gates and walls built in the Ming Dynasty (1368-1644), as well as five frontier passes of the Qing Dynasty (1644-1911).

In addition, there are 88 ancient buildings, such as ancestral halls, temples, shops and guild halls, more than 120 ancient dwellings and the ruins of Government offices, as well as the residences of many famous figures. Fenghuang Ancient Town maintains the intact pattern of urban construction and historical appearance as in the Ming and Qing dynasties.

The buildings on the more than 30 ancient streets and alleys, are integrated with the surrounding natural environment, presenting a harmonious scene of mountains, water and people. Walking in the alleys, with green bricks and tiles, the mottled city walls are grayish-blue, as if stepping into the palace of the chieftain 100 years



Photo 2: Fenghuang tujia stilted houses or Diaojiaolou along the Tuojiang river bank

ago. On the Tuojiang River outside Fenghuang, there are 17 bridges of various sizes, forming a natural gallery from the upstream Fenghuang Bridge to the downstream Yunqiao Bridge.

The most striking feature on both sides of the Tuojiang River are the rows of well-arranged hanging buildings or *diaojiaolou*, as the Tujia style of construction. These are wooden structures hanging over the river facing the scenic water and the street across the river. These Tujia hanging buildings over river bank are unique to Fenghuang although the normal Tujia buildings are built along hill sides at the mountainous region of Hunan and Guizhou.

Tujia Construction

Diaojiaolou is a type of building inherited from Tujia people's ancestors. It is a typical architectural form in the Tujia areas in western Hunan and western Hubei. It has a history of more than 4,000 years. Most of the stilted buildings are built on the mountain side, and the main house is built on the ground. Except for one side of the wing that is connected to the ground and the main house, the other three sides are suspended and supported by pillars or stilts. The lower layer is a pig and cattle pen or used to stack debris.

The Tujia stilted building groups which stand on the edge of the Tuojiang River in Fenghuang and with a history of 100 years are one of the most striking and spectacular views in Fenghuang. Most Tujia stilted buildings are near the East Gate Hongqiao and the North Gate Rock Jumping. One end is the river bank, and the other end is above the river surface where the river flows. The wooden pillars support the rows of stilted buildings anchoring them firmly along the river bank. From time to time, the boat canopy passes by, causing layers of ripples towards the stilts, and the reflections in the water also sway around. The quaint Tujia *Diaojiaolou* is now a unique scenery in the ancient city of Fenghuang. Whether it is shrouded by the mist in the morning or the street



Photo 3: Intricate wooden beams at one of the Fenghuang houses

lights in the night, it is a major attraction for countless tourists.

As a social interaction spot, Fenghuang Town has a characteristic water street corridor. One side of the river bank consists of rows of shops while the other side consists of a long stretch of stone steps descending into the water forming a leisure area stroll to enjoy the scenic flowing river. This street is a place for people to relax and shop.

Stepping Stone River Crossing

Facing the North Gate of Fenghuang Ancient City, the Stepping Stone river crossing is a unique crossing connecting the two sides of the river banks which is formed by two rows of individual square stone piers. As the name suggests, crossing the river through the Stepping Stone requires one to jump on each step with the fast flowing water under your feet. This is also one of the most popular photo shooting spots in Fenghuang.



Photo 4: The stepping stone river crossing as the popular spot for tourists

Phoenix Hong Bridge

Phoenix Hong Bridge, also known as The Rainbow Bridge Art Building at the center of Fenghuang Ancient Town was built in 1368 AD. Standing on the bridge, one can view the picturesque scenery of the Tuojiang River banks. The unique design of the masonry bridge with two levels for pedestrian passage is a gathering place for locals to enjoy the scenic river and the surrounding buildings and city walls.



Photo 5: Phoenix Hong Bridge

Fenghuang City Gate Towers

The East Gate Tower is the oldest gate tower in Fenghuang. At 11m high, it has eight gun holes above the gate for defence purpose during ancient times. The North Gate Tower was first built in the Ming Dynasty. In the Yuan and Ming Dynasties, it was the office site of the leader of five villages. Going downstairs from the gate, one will reach the bank of Tuojiang River.

Tentative UNESCO listing

Fenghuang has all the attributes on Overall Universal Value for listing as a UNESCO cultural heritage site and is one of the 61 sites submitted by PR China to apply for UNESCO Heritage Listing.

The justification of Outstanding Universal Value covers the following:

Criterion 1

Ancient Fenghuang Town is situated at the foot of mountains and beside waters. Its construction has proved to be a very practical and scientific exploration in terms of the town site selection as well as layout design and city planning. Following the undulation of the mountainous landscape, the town walls encircle the ridges and span over the ranges while rivers wind along the corridors before flowing out through the town. It is thus by absorbing the artistic philosophy of traditional Chinese garden design and making best of the limited space of the mountain area that the town achieves well-structured layout. Such distinctive building clusters displays the intelligence, talents and enthusiasm of the architects, and can be called a creative and genius masterpiece.

Criterion 2

Ancient Fenghuang Town is a well-preserved integral and authentic historical site. The plentiful historical and cultural information has evoked great interest among litterateurs, artists, historians as well as architects. The unique cultural information carried by the ancient town may well serve as an outstanding example for human settlement construction and promote the development of architecture, environment protection and technical design.

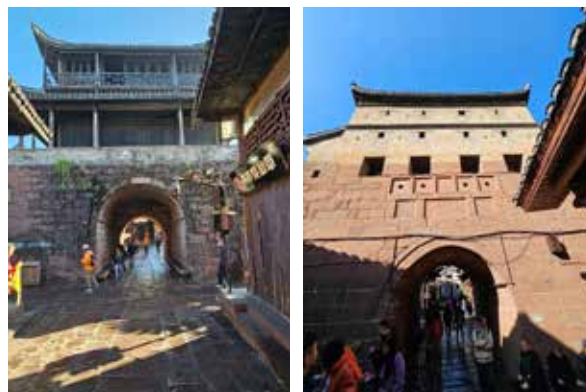


Photo 6: City gate tower



Photo 7: Local Tujia girl posing at the river bank of Tuojiang river bank

Criterion 3

With the advancement of society, ancient civilization and traditional culture are more or less vulnerable to the encroachment of modernisation. This is especially true in small towns. In Ancient Fenghuang Town, ethnic languages, custom, arts as well as distinctive architectural remains of Ming and Qing styles all carry a large amount of historical information of the rich culture in the ancient State of Chu. Therefore, to enlist Ancient Fenghuang town into the World Heritage List will provide effective protection of the profound influences and development of Chinese culture.

Criterion 4

The town site selection, layout planning and construction of Ancient Fenghuang Town has made wonderful use of the mountain landscape and the water flows to create a harmonious relationship between human residence and nature, thus making it an outstanding example in this respect. It has been the most distinctive architectural clusters in the remote frontier mountainous area of South China (where different ethnic groups merge with each other). ■

Batu Gajah Steam Power Station at Tanjung Tualang, 1953

By Cheo Hong Keyong



View of Batu Gajah steam power power station situated at Tanjung Tualang taken in 1953. Notice the overhead electric cable connected to the power station through the pylon. A tall chimney was built to emit black smoke from the coal fire boiler to generate steam for electricity generation. (Photo courtesy of Jabatan Penerangan Malaysia)

The Perak River Hydro Electric Power Company was formed by Balfour Beatty Limited in London in 1926 to generate electricity for tin mining activities in the Perak region.

The Batu Gajah power station was one of the three Electric Power Stations built in the state of Perak in 1933 after Malim Nawar in 1928 and Chenderoh in June 1930. They were officiated and opened by the Sultan Iskandar Shah of Perak.

Batu Gajah and Malim Nawar power stations used coal and diesel to produce steam to generate

electricity. Due to the thick black smoke and soot created by coal, tall chimneys were built to emit it to the atmosphere. During the heydays of the tin mining industry, 40 dredges were operated in Perak. These three power stations supplied electric power to all the dredges in the region. Most of the dredges were owned by Malayan Tin Dredging Company Limited (MTD).

Due to world recession in the 1970s, the Batu Gajah Power Station was decommissioned in 1976 and demolished in the 1980s. ■

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