



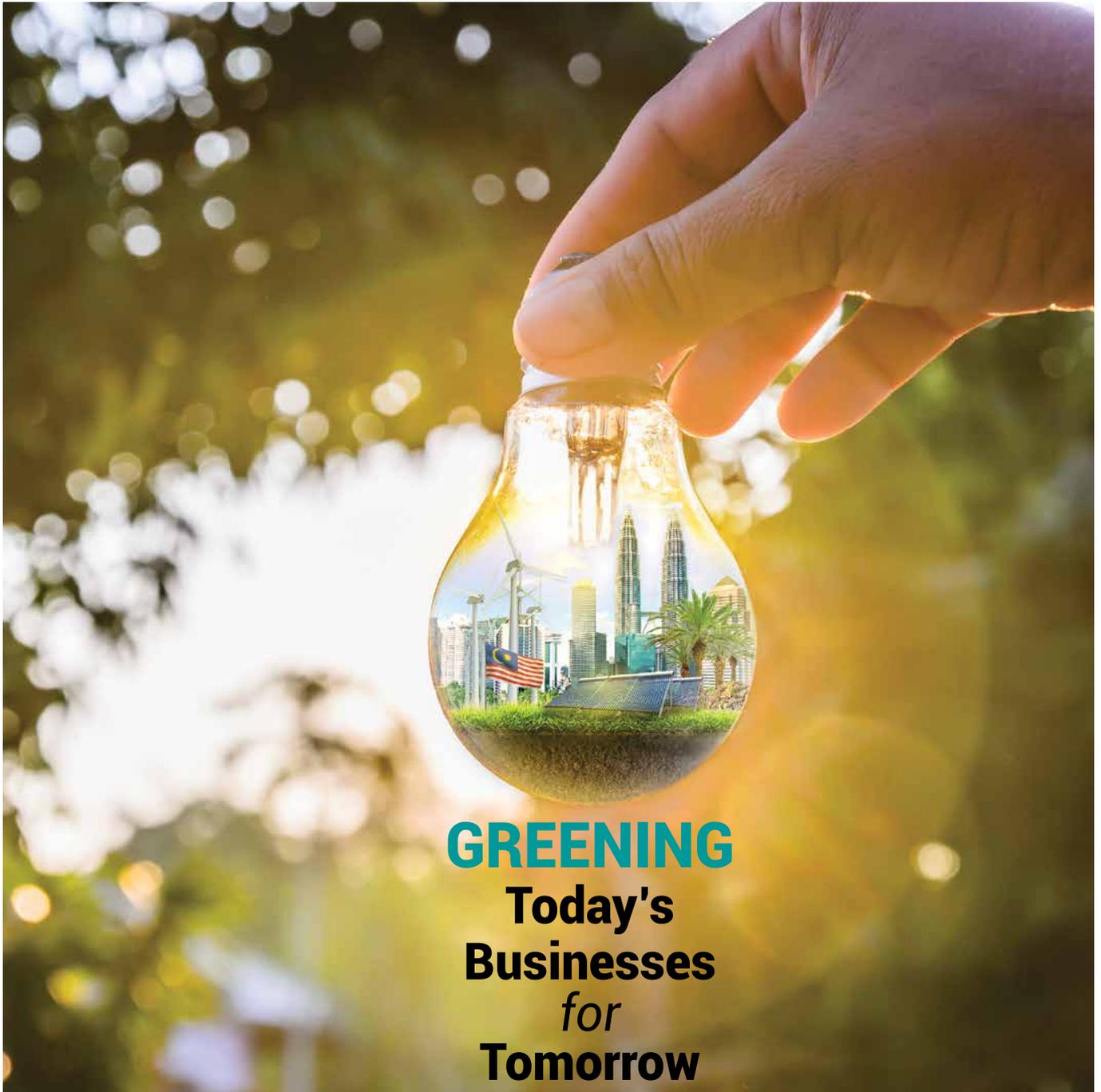
SIRIM

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SIRIMLink

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GREENING Today's Businesses for Tomorrow

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Greener Businesses*

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Alternative Solution to
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Best Partner for Innovation



FOREWORD

Going GREEN

Recent years have seen the world's spotlight being trained on environmental issues. As part of a global community, it is our responsibility to ensure that we are not only able to sustain our current population but also leave a world that is conducive for the growth and prosperity of future generations. Hence, nations across the globe are choosing to adopt a "green economy" which, according to the UN Environment, "results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcity".

As Malaysia forges a path down this road, there is a need to increase environmental awareness and implement proper benchmarks that will enable us to measure our progress. This is SIRIM's forte. With a strong foundation built on decades of experience and expertise in industrial research, development and standards, we play an important role in supporting our nation's green journey. Together with the collective collaboration of industry players, we are confident that the sustainable growth of our economy, environment and society will be achieved.



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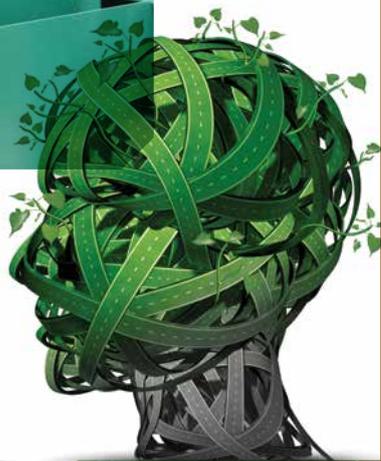


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In order for Malaysia to move toward a greener economy, it has become more and more imperative for businesses to incorporate eco-innovation as a key pillar in their operations. SIRIM offers an array of services to help them achieve this.

Green Services for Greener Businesses



Eco-innovation encompasses technological and non-technological forms of innovation that are applied to create business opportunities and benefit the environment. The latter can be done with the optimisation of resources. With Malaysia placing the spotlight on a greener and more sustainable economy, it is time for businesses to get on the bandwagon and embrace eco-innovation so that they can thrive in a rapidly proliferating green marketplace. This is where SIRIM can help.

The Environmental Technology Action Plan (ETAP) defines eco-innovation as “the production, assimilation or exploitation of a novelty in products, production processes, services or management and business methods, which aims, throughout its life cycle, to prevent or substantially reduce environmental risk, pollution and other negative impacts of resource use (including energy)”.

According to Isnazunita Ismail, General Manager of the Environmental Technology Research Centre in SIRIM, eco-innovation in businesses is wide-ranging. Via consultancy services, SIRIM is able to help the respective businesses adopt eco-innovation and improve in aspects such as energy consumption efficiency, non-toxic by-products, proper treatment of emissions and renewable energy alternatives.

“When we talk about eco-innovation, we are looking towards meeting sustainable development goals. These are innovations that are able to adapt to environmental pressure and reduce adverse impacts to the environment as well as usage of natural resources,” she explained.

Typically, a business produces either a technology or product. In the context of eco-innovation, the former encompasses a technology that performs well above normal standards or that presents an innovative approach to solving an environmental problem.



When we talk about eco-innovation, we are looking towards meeting sustainable development goals. These are innovations that are able to adapt to environmental pressure and reduce adverse impacts to the environment as well as usage of natural resources.

For marketing purposes, the business can then approach SIRIM to assist them in conducting a verification process on the technology under the Environmental Technology Verification (ETV) programme, which is based on the ISO 14034 standard.

This allows the producer of the technology to obtain an objective report from a third party that proves their technological claims and it is based on independent and reliable test data. This is beneficial for all parties involved. For one, manufacturers are able to show proof that they are not just making claims. Furthermore, purchasers will have greater confidence in procuring the technology when previously they were more reserved in buying new technology unless it was well proven in market. Meanwhile, policymakers will be able to have a better understanding of the said technology for further decision making.

Green products, on the other hand, refer to products with inherent traits that include the use of recycled, non-toxic or biodegradable materials. Other criteria for green products are energy efficient production processes, less or zero pollution and non-toxic by-products.

"For certain products, SIRIM can help to identify how these products will impact the environment throughout



There are many companies in industrial parks. However, they usually do not communicate with each other. SIRIM assists to create an industrial symbiosis among these companies.

their life cycles. From an initial Life Cycle Assessment (LCA), we come up with a product criteria document. With the document in hand, we can then audit the product in particular, based on a set of criteria," said Isnazunita.

SIRIM also has accredited testing facilities to assist businesses in testing their product or they can engage other credible testing labs. Subsequent to the audit and certification process, the product will then receive the SIRIM Eco-label mark, which is based on the ISO 14024 standard.

Product manufacturers also have the option of applying for the Carbon Footprint certification (ISO 14067). For this, the carbon emission equivalent of the product will be quantified, and the product will then be awarded a SIRIM Carbon Footprint mark that carries its carbon footprint value.

Sharing Resources

SIRIM has also set its sights on a wider horizon, for example, industrial parks. "There are many companies in industrial parks. However, they usually do not communicate with each other. SIRIM assists to create an industrial symbiosis among these companies," explained Isnazunita.

What this means is that SIRIM will play an intermediary role in identifying the inputs and outputs of the companies within the industrial park and determining how one company's by-product can be used by another company.

"We will work on the calculations and make the relevant recommendations based on the results. This way, instead of just disposing its by-products, a company may have the option of passing these on to another company nearby that can utilise them. If interested, the companies can then negotiate among themselves," Isnazunita said.

With the assistance of an organisation under the Asia-Europe Meeting (ASEM), SIRIM is also attempting to promote the idea of eco-industrial parks in Malaysia. "The ASEM SMEs Eco-Innovation Center (ASEIC) in South Korea has successfully implemented the concept of Eco Industrial Park (EIP) there, so now we are in the process of transferring the knowledge to be implemented here in Malaysia," she shared.



SIRIM will play an intermediary role in identifying the inputs and outputs of the companies within the industrial park and determining how one company's by-product can be used by another company.

Isnazunita Ismail,
General Manager of the
Environmental Technology
Research Centre



Green Footprint

In addition to products, carbon footprint initiatives are also applicable at organisational level. In fact, with more and more developed countries setting up green-centric regulations, these initiatives could be a timely development to prepare the industries here that are looking to penetrate or are already in the international marketplace.

"The carbon footprint certification is voluntary, but it will enhance the trade value of our local industries and prepare them for if and when purchasers from developed countries may require this," commented Isnazunita.

It is imperative that all the players in the country are on the same page when it comes to endeavours like this. "If there is only one company following the standard, it won't be so effective. With a national-level ETV programme, everybody will adhere to it, making it more transparent and reliable, with better data compilation as well," she continued.

Walking the Talk

This is where initiatives rolled out by the government can make it easier to increase national awareness of the green services available to businesses in the country and their importance. "Phenomena like climate change are too apparent to ignore. But how can we mitigate this? It has to be done from a higher level for the impact to cascade down to the rest of the people. In promoting the endeavours themselves, the relevant ministries are essentially 'leading by example' – the rest of the citizens will then follow suit," detailed Isnazunita.

"This means businesses that wish to be a part of the Government Green Procurement (GGP) process will need to have some form of certification to show that they are 'green'. As a bonus, the businesses will also have a distinct advantage in the global marketplace as well," she elaborated.

Much headway has also been made at state and local levels. Among others, SIRIM has been working closely with the state governments and Local Authorities (LAs) to educate the public and encourage food waste segregation at various food premises, allowing the food waste to be converted into energy in-situ using the Anaerobic Digestion (AD) system. The food operators are also encouraged to use biodegradable dishwashing detergent, as well as being required to install and maintain grease traps which will be periodically evaluated by SIRIM to ensure that they are performing well.



This means businesses that wish to be a part of the Government Green Procurement (GGP) process will need to have some form of certification to show that they are 'green'. As a bonus, the businesses will also have a distinct advantage in the global marketplace as well.



The carbon footprint certification is voluntary, but it will enhance the trade value of our local industries and prepare them for if and when purchasers from developed countries may require this.



Currently, single-use plastics are also under scrutiny by the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC), with the use of biodegradable plastics being encouraged.

"At SIRIM, we already have a plant that can produce polyhydroxyalkanoate (PHA), a form of bio-plastic. However, it requires further investment to upgrade the downstream process and scaling up the process to be more economically viable," said Isnazunita.

SIRIM has also been doing its part to reduce plastic usage at agency level. "We have eliminated the use of plastic disposable cups as well as cling-wraps on refreshments during meetings," she shared.

The government has been looking at the shutdown of illegal plastic recycling companies and ensuring that the imported plastic wastes from these factories are handled properly.



With proper awareness and understanding of the environment and sustainability, industry players and the general public will be able to take advantage of what the country has to offer to move it closer to its goal.



Currently, single-use plastics are also under scrutiny by the Ministry of Energy, Science, Technology, Environment and Climate Change (MESTECC), with the use of biodegradable plastics being encouraged.



Artificial reefs placed near the shoreline

Land and Sea

Malaysia's initiatives for a greener society are not confined to land. "We are also concerned about the marine environment," declared Isnazunita.

For example, in Sabah, there have been efforts to promote artificial reefs (tukun) made from eco-materials for attracting benthic fish near to the shoreline. On the other hand, floating fish aggregating devices (FFADs), or locally known as *unjam*, are placed at the open sea in hopes of attracting pelagic fish such as tuna and redirecting them away from oil rigs. "This is also for the safety of the fishermen, to ensure that they do not go too close to the oil rigs," she explained.

SIRIM continues to look into more initiatives that take advantage of eco-

materials to help industries. "Just recently, we were discussing about rubber waste recycling. Currently they burn tyres to recover oil, steel wires and carbon, for example. But now there is an alternate burning technique that provides better combustion control and emits less pollution. We are also looking into what we can do with the recovered materials for different applications," divulged Isnazunita.

The road heading toward a greener economy is long, but the potential is definitely there; and Malaysia has taken a significant step forward. With proper awareness and understanding of the environment and sustainability, industry players and the general public will be able to take advantage of what the country has to offer to move it closer to its goal.

Carbon Footprint: Your way towards Environmental Sustainability



A cross-cutting issue across the nations worldwide is to ensure that the economic developmental growth involving anthropogenic activities causes minimum harm or disruption to the environment.

One of the environmental impacts affecting the planet that is garnering global attention is climate change (global warming). Efforts and initiatives at all levels, be they international, regional or national, are being actively discussed and implemented to reduce the emission of greenhouse gases (GHG) into the atmosphere.

The world's carbon equivalent emissions or GHG emissions in general are caused by the burning of fossil fuel for power and heat, transportation and agriculture. Main sources of global warming in Malaysia are the energy, transport, manufacturing and construction sectors.

Carbon Footprint: An LCA's Single Impact Category Measurement

While Life Cycle Assessment (LCA) as an environmental assessment technique may be considered by many businesses as more academic in nature rather than for practical business use, carbon foot-printing has caught the interest of most entities looking to showcase leadership in green initiatives towards



While Life Cycle Assessment (LCA) as an environmental assessment technique may be considered by many businesses as more academic in nature rather than for practical business use, carbon foot-printing has caught the interest of most entities looking to showcase leadership in green initiatives towards managing environmental sustainably.

managing environmental sustainably. The LCA approach is considered to avoid shifting environmental burdens from one stage to another throughout the life cycle chains.

Carbon foot-printing is based on the principle of the LCA focusing on a single impact category, i.e. global warming potential. The results of carbon emissions, aka carbon footprint, associated with an activity, a process or a product derived from raw material extraction, energy and utilities consumption, transportation of materials and disposal of wastes as a complete cradle-to-grave approach will determine the global warming potential of the system,

which will eventually translate into its impact to the climate change.

Carbon footprint measurement is a quantitative measure of a certain level of activities that results in GHG emissions. In carbon foot-printing, considered activity data is multiplied by a carbon emission factor to derive the associated carbon equivalent emission from various GHGs. The commonly addressed or prominent GHGs are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The carbon emission factor is expressed in the unit of mass equivalent to carbon, i.e. kg CO₂ equivalent (kg CO₂ e per unit output).

The Carbon Footprint Edge

Carbon footprint is normally used in business-to-business communication. Apart from that, its usage for business-to-consumer communication is trending with the avenue of carbon labelling. Carbon footprint would benefit both the supply and demand aspects, whereby:

- Businesses can communicate the environmental attributes of their products or services to their customers
- Businesses can use carbon footprint results as a marketing tool to show that their products are better than their competitors' in terms of environmental performance
- Consumers are able to make informed decisions in their purchasing based on the environmental performance of products or services
- Consumers are aware of how their purchased products or services contribute to carbon emissions and global warming
- Initiatives towards carbon reduction can be translated into cost savings for both businesses and consumers

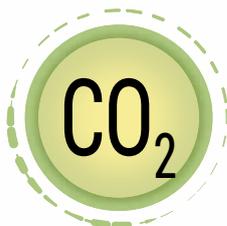
Carbon foot-printing provides options in its application. As a technique, it can be used to measure the carbon footprint of the organisational system, value chain, process, product or supply chain.

Organisation Carbon Footprint

The principles and requirements of GHG emission quantification and reporting at the organisational level are as prescribed by the ISO 14064. The organisation carbon footprint requirements include the design, development, management, reporting and verification of an organisation's GHG inventory.

An organisational carbon footprint will help organisations understand the sources of carbon from their operations, including energy used by premises, processes and business travel.

CARBON DIOXIDE



transportation, fossil fuel combustion, coal and crude oil

METHANE



natural gas systems, landfills, agriculture

NITROUS OXIDE



manufacturing, agriculture, cars

HYDROFLUOROCARBONS



semiconductor manufacturing

PERFLUOROCARBONS



aluminium production

SULFUR HEXAFLUORIDE



electrical transmission, magnesium production



An organisational carbon footprint will help organisations understand the sources of carbon from their operations, including energy used by premises, processes and business travel.

Product Carbon Footprint

"Carbon footprint (CFP) of a product is a sum of GHG emissions and removals of one or more selected process of a product system, expressed as CO₂ equivalent (CO₂e) and based on life cycle assessment" - ISO/TS 14067:2013.

A product carbon footprint enables manufacturers to differentiate their products' environmental performance from that of their competitors based on carbon equivalent value. For a similar product category, having a lower carbon footprint value suggests that the product is more environmentally sustainable in comparison to the higher carbon footprint-valued products.

At the same time, carbon foot-printing provides the avenue for the manufacturers to identify the environmental hotspots along its life cycle stages and to improve the product's carbon emission through carbon reduction options.



SIRIM is one of the prominent technology, quality, standards and certification providers in Malaysia. SIRIM, with its niche formation, acts as a one-stop centre for the environmental performance assessment of products and organisations from measurement, verification and certification to labelling.

Providing Support for Environmental Performance Sustainability Assessment

SIRIM is one of the prominent technology, quality, standards and certification providers in Malaysia. SIRIM, with its niche formation, acts as a one-stop centre for the environmental performance assessment of products and organisations from measurement, verification and certification to labelling.

The technical team in SIRIM's Environmental Technology Research Centre (SIRIM-ETRC) provides technical support in conducting carbon footprint assessments using a carbon foot-printing toolkit developed in-house by SIRIM known as "SIRIM Karbon Kalkulator". The carbon footprint reports that meet the reporting requirements can be utilised by companies for subsequent third-party verification, certification and labelling by SIRIM QAS International.

SIRIM-ETRC is also responsible for the management of the Malaysia Life Cycle Inventory Database (MYLCID). MYLCID is an online database system providing life cycle inventory (LCI) results for materials, processes and systems pertinent to our country in terms of geographical and technological coverage. The LCI results comprise input and output flows which are essential in carbon accounting. *Please visit <http://lcamalaysia.sirim.my/> to find out more.*

SIRIM STS, a subsidiary company, takes environmental performance assessment to the next level through the development of SIRIM Product Category Rules (PCRs) for Carbon Foot-printing. PCR is developed to harmonise and to provide consistency in the calculation of the carbon footprint value of different products within a similar product category. The development of PCRs enables fair evaluation of environmental impacts between products of similar

The SIRIM Carbon Label scheme was introduced in 2014 as an output of the Switch-Asia Grant to SIRIM Berhad for the development of an Environmental Declaration Scheme for Construction and Building Materials

functions. PCRs are developed and published at the request of interested parties. Currently SIRIM has published nearly 15 PCRs with the majority of them being for building materials and construction products.

The published PCR as a standard document enables SIRIM QAS International to offer third-party compliance assessment, verification, certification and labelling for product carbon footprint. *Please visit <https://standards.sirimsts.my/> to find out more.*

SIRIM Environmental Sustainability Assessment

SIRIM STS

Standards Department

Standardisation

- Standardisation Secretariat
- Establishment and coordination of WGs
- Approval of PCD & PCR
- Publication of PCD & PCR
- Custodian of PCD & PCR

SIRIM Berhad

Environmental Technology Research Centre

Consultancy

- Technical resources
 - Carry out data review and study on comparative data
 - Drafting of preliminary PCD & PCR documents
 - Provide carbon footprint analysis
 - Conduct eco-labelling related lab testing

SIRIM QAS International

Product Certification & Inspection Department

Certification & Labelling

- Identification of product for the "green market" sectors
- Provide independent verification, certification and labelling

* Product Criteria Document (PCD); Product Category Rule (PCR)



A product carbon footprint enables manufacturers to differentiate their products' environmental performance from that of their competitors based on carbon equivalent value.



As a leading name in standards development, SIRIM has come up with several environment-centric standards to ensure that all the major players are on the same page in Malaysia's journey towards a green economy. Consultants Salwa Denan and Norfaizah Nasir tell us about two such standards that will soon be ready for the public.

Standards for a Greener Economy

In recent years, SIRIM has been laying out the guidelines to help the country make a smooth transition towards developing a greener and more efficient economy. The Design for Environment (DfE) and Material Flow Cost Accounting (MFCA) standards will help the nation, particularly manufacturers, to take environmental aspects in the product life cycle into consideration. These are currently in the final stages of development.

The DfE takes a holistic look at the manufacturing process from inception to disposal and primarily targets the product designers, while the MFCA is an extension of Conventional Cost Accounting (CCA) that provides a more in-depth perspective of the material, energy, system and waste management costs within the production line.

The former provides guidance for organisations to create or innovate products and/or processes to ensure that they are desirable in the market, conform to certain market regulations, are produced at minimal costs and will not adversely affect the environment. In fact, the fundamentals of the DfE are derived from the concepts of life cycle thinking, quality and environmental management systems, and management commitment.

Life cycle thinking refers to a framework that takes a holistic consideration of all environmental aspects relevant to a product during its entire life cycle.

According to Salwa Denan, Senior Consultant of the Standards Department in SIRIM, "The DfE covers the entire product life cycle from 'cradle to grave' essentially. We highlight the steps and tips that need to be taken into consideration before the product design and development process can begin."

◀ Salwa Denan,
Senior Consultant

▶ Norfaizah Nasir,
Consultant



The Heart of Design for Environment

The DfE contains a total of nine clauses. Clause 8 addresses the operational aspects, providing guidance on how to get started designing a new product, introducing improvements to an existing product, or redesigning or modifying an existing product.

It involves the following steps:

1. **Exploring potentials and opportunities** via customer feedback, technological analysis and market intelligence with consideration for the environment, government regulations and current trends, to name a few. A market attractiveness study is also performed for recovered product derivatives and product recovery analysis is conducted to minimise landfill waste.
2. **Refinement of accepted ideas** encompassing value engineering and life cycle impact assessment to reduce environmental impact and promote product recovery.
3. **Management of product development project** with the selection of low impact materials, product design with timeless aesthetics and/or other features that reduce adverse environmental impacts during use, ensure easy reparability, maintenance and upgradability of the product as well as the feasibility of recovery, biodegradability and disposal safety of the components and packaging

In addition to that, the standard also addresses the roles of the top management team, the risks and opportunities that arise, the resources and communication during the design and development process, how to apply the DfE when designing a new product and the continuous review and improvement of the entire product life cycle process.

Meanwhile, Norfaizah Nasir, Consultant of the WTO TBT, Technical Information and Consultancy Section, Standards Department of SIRIM, considers the MFCA to be a management tool that can assist organisations to understand the potential environmental and financial consequences arising from material and energy use in the production process.

When it comes to CCA, the material and processing costs are lumped into one amount. This gives the indication that waste has no cost. "Most organisations are unaware of the actual costs of their materials as it is usually very difficult to obtain this data," she said.

The MFCA, which is based on the ISO 14051, identifies material loss in terms of physical and monetary terms. "From the information gathered, organisations will be able to find opportunities for improvements and enhancements of these practices to ensure that they benefit in financial and environmental aspects," she continued.



The MFCA identifies the inputs and outputs of each manufacturing process, enabling the organisation to measure the material, energy, system and waste management costs. From there, they will be able to understand how much material is lost and the costs incurred from the loss.

The standard was developed to offer an understanding of the MFCA concept and provide guidelines for organisations that wish to implement the MFCA model in their operations in order to systematically identify root causes of material losses and the associated factors that incur the costs.

"The MFCA identifies the inputs and outputs of each manufacturing process, enabling the organisation to measure the material, energy, system and waste management costs. From there, they will be able to understand how much material is lost and the costs incurred from the loss," explained Norfaizah.

"For example, if from 100kg of input, 70kg is transformed into products, the balance 30kg is considered as material loss. The processing cost is subsequently calculated based on this material distribution percentage".

In a typical manufacturing process, there is input, the resultant product and waste. The latter is considered material loss.

Laying the Foundation

Both the DfE and MFCA standards are intended for use by all parties who are involved in the design and development of products, services and manufacturing activities; whether new or modified, regardless of the type, size and location of the organisation. The standards offer plenty of benefits, especially in terms of cost reduction, environmental protection and better marketability.

For example, potential benefits of the DfE include improved human health and environmental performance; reduced resources and energy requirements leading to low energy, material, production, labour and distribution costs; improved quality, functionality and benefits of the products; low green market compliance costs; lower product

end-of-life management and waste disposal costs; improved waste management/pollution prevention systems; improved customer and supplier relationships; enhanced customer performance and quality inspections; and increased potential for market leadership.

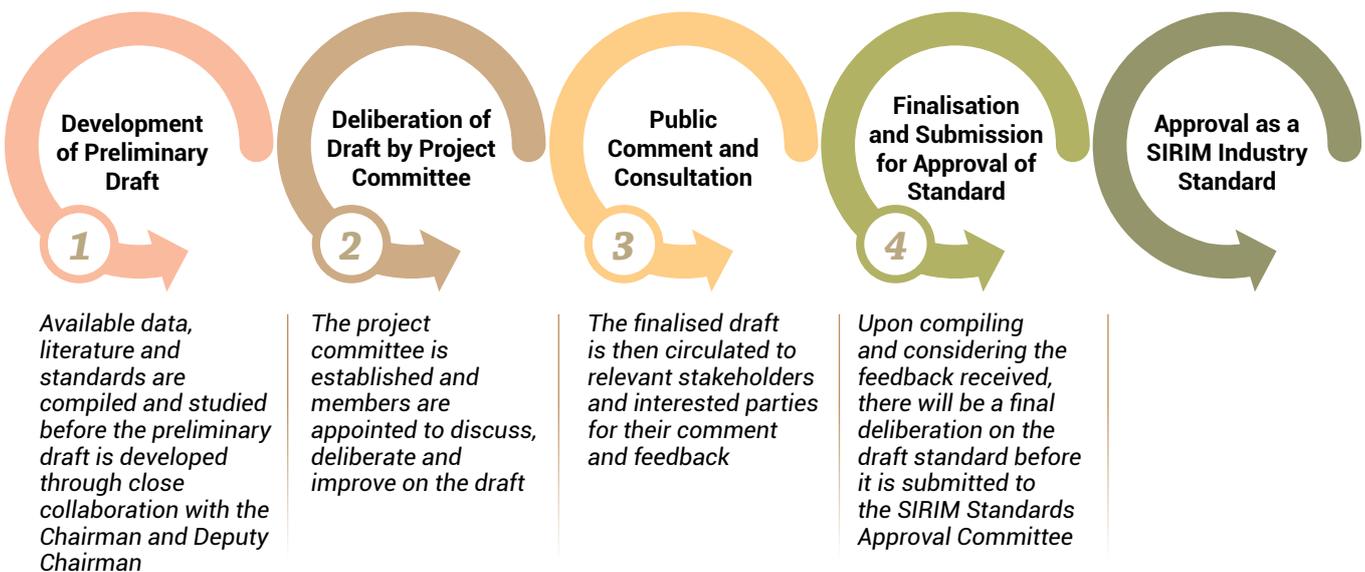
With most organisations being unaware of the actual cost details of material losses, the MFCA also allows for the necessary data to be obtained more easily. "The organisations would then be able to identify the relevant issues, for example, the process that produces the most waste, and take the necessary steps to make improvements," explained Norfaizah.

As with all SIRIM Industry Standards, the DfE and MFCA followed four main stages of development.



The DfE takes a holistic look at the manufacturing process from inception to disposal and primarily targets the product designers, while the MFCA is an extension of Conventional Cost Accounting (CCA) that provides a more in-depth perspective of the material, energy, system and waste management costs within the production line.

Four Stages in the Development of SIRIM Industry Standards



"The DfE draft is being circulated for public comment for one month, during which we welcome comments from all interested parties," informed Salwa. There will also be a consultation session, whereby relevant stakeholders are invited to give further comments which will then be incorporated into the draft.

The MFCA draft, meanwhile, has completed the public comment phase. "The comments received are being reviewed by the project committee and is targeted to be available to the public soon," said Norfaizah.

It is anticipated that the DfE standard will be approved by the end of the year and be ready for the public in the beginning of 2019.

"Through the government's initiatives and the United Nations Sustainable Development Goals, the awareness level of eco issues among Malaysians is increasing," commented Salwa.

"As part of a community that protects the environment, we need to be able to play our role in reducing our waste and ensuring sustainable consumption. These standards will help organisations understand how to do this," added Norfaizah.

For updates and notifications on the standards, visit the SIRIM STS website at www.sirimsts.my for more information.

Bio Natural Gas: A Rising Star in Renewable Energy

Bio natural gas has the potential to take the renewable energy sector by storm. In tandem with the government's efforts to place greater emphasis on renewable energy generation, SIRIM takes on the challenge to forge this new pathway in Malaysia toward catalysing the growth of the country's green industry.



BioNG

Bio natural gas, or BioNG, is derived from bio-matter. It can be obtained from upgrading biogas or the methanation of bio-syngas, and has the same logistic needs as natural gas. An ideal substitute for natural gas, BioNG burns a clean, blue flame comprising 95% methane and is similar to petrol or diesel, but with significantly lower carbon dioxide emission.

Did you know that one tonne of waste can generate enough bio natural gas (BioNG) to fill up to five 14kg-capacity cooking gas cylinders? A relatively newcomer in the renewable energy scene in Malaysia, BioNG has, nonetheless, proven itself to be a strong contender.

As its name suggests, BioNG is produced from biowaste which, in addition to palm oil mill effluent (POME), also includes food waste and industrial waste. Unlike biodiesel, which is in liquid form, it is a gaseous form of biofuel. In technical terms, it has the same chemical composition as conventional natural gas and can be used interchangeably. Consequently, it can be used in the form of compressed natural gas (CNG) or liquid natural gas (LNG).

The foray into BioNG in Malaysia began as an attempt to monetise POME. "There is a lot of biogas in POME that is not being utilised fully. In converting the biogas from the POME to a form that is similar to the quality of natural gas, we are able to widen the scope of applications," explained Azhar Abdul Raof, Director of the Industrial Centre of Innovation in Bio Natural Gas at SIRIM. Among others, BioNG can be used as fuel for vehicles, for cooking and in industrial boilers and furnaces.



BioNG is the best fuel in terms of carbon emission!

BioNG is set to increase the share of sustainable bioenergy in fuel energy consumption to up to 400 mmbtu (million British Thermal Units) per day per plant as well as reducing carbon dioxide (CO₂) emission by 28,000 ton-CO₂ per mill. As such, BioNG has the potential to decrease our carbon footprint and is, in fact, comparable to common renewable energy resources like wind and hydro power. "BioNG is the best fuel in terms of carbon emission!" declared Azhar.

Although BioNG is new in Malaysia, the efficacy of BioNG is well established in Europe, and the gas enjoys increasing popularity in countries like Germany, the UK and Sweden. A leading BioNG user, Germany has successfully converted all its waste and is turning to energy crops to meet its energy needs. Sweden, meanwhile, is home to at least 12 BioNG filling stations along the highway between Göteborg and Stockholm. It is estimated that 7,500 vehicles using 23 million m³ of BioNG have eliminated the emission of 33,000 tonnes of carbon dioxide per year.

BioNG: A Sustainable Solution



Increasing the share of sustainable bioenergy in the final energy consumption (200 - 400 mmbtu/day/plant)



Reduced CO₂ emissions (28,000 ton-CO₂/mill)

Packing a Punch

As one of the greenest fuels in the market, BioNG offers plenty of benefits to the environment. Among others, it can decrease the emission of greenhouse gases and reduce dependency on fossil fuels in the energy and transportation sectors, with carbon dioxide emissions from BioNG being 90% lower than conventional diesel or petrol.

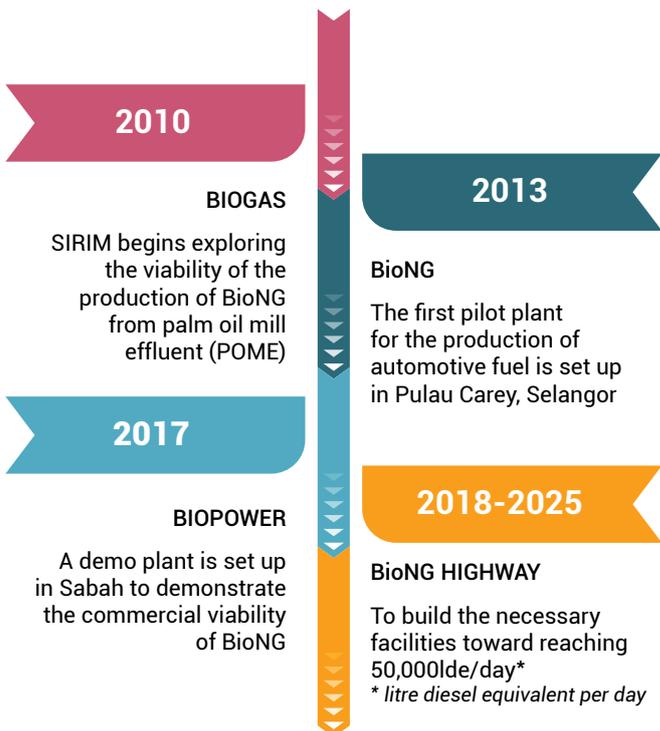
"This is one of the biggest advantages of BioNG. With its low carbon emissions, it is a good source to mitigate climate change," said Azhar.

As a clean-burning fuel, BioNG also produces lower amounts of nitrogen oxides, sulphur, particulates and mercury, making it much safer than petroleum. This subsequently reduces air pollution as well as risks of respiratory diseases like asthma, bronchitis and lung cancer.

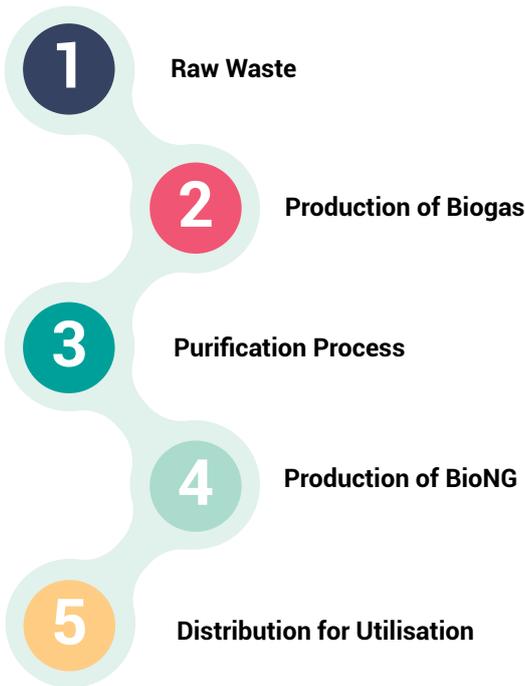
In and around the vicinity of oil palm plantations, the BioNG from POME can be used on or offsite, increasing the sustainable value of palm oil. The local communities will also benefit from a socioeconomic standpoint. "It will be easier for the settlers or plantation workers to fill up their vehicles. Furthermore, palm oil mills typically emit an unpleasant odour. As a BioNG plant is enclosed, the odour will be reduced significantly, thus increasing quality of life for the people living nearby. The opening of a BioNG plant would also create more job opportunities," explained Azhar.

This translates to savings for oil palm industry players as well. "The palm oil mills are already generating the gas. This raw waste for them is free. They just haven't captured it. Once they do that, they can put the gas to good use and reduce their costs as well as the environmental impact," he continued.

BioNG Roadmap in Malaysia



Converting Waste to Bio Natural Gas



Demonstrating Success

In 2017, SIRIM established a demo plant in Tawau, Sabah, to showcase the commercial viability of BioNG, focusing on the creation of a comprehensive value chain encompassing the obtaining of raw resources, production, processing, storage, distribution and usage of BioNG. To date, SIRIM has also constructed a BioNG filling station along the Merotai-Kalabakan/Pan-Borneo highway to cater to highway users as well as plantation vehicles.



It is estimated that 7,500 vehicles using 23 million m³ of BioNG have eliminated the emission of 33,000 tonnes of carbon dioxide per year.

An Ongoing Journey

In pioneering the BioNG sector, SIRIM is involved across its entire value chain – from purification and production to distribution, utilisation and standards development as well as the testing and verification process.

The conversion process is relatively simple. A close pond is filled with the POME to produce biogas which is then directed into a series of purification chambers. Here, impurities such as carbon dioxide, hydrogen sulphide and moisture are filtered out. The resultant BioNG has a higher methane content of approximately 93% compared to raw biogas, making it similar to conventional natural gas.

In order to promote awareness and educate people about the benefits of BioNG, a demo plant was set up in Sabah last year. “The bulk of the palm oil mills are located in Sabah, many of which do not have easy access to fuel. As such, the BioNG fuel can be a feasible option for them,” shared Azhar.

The demo plant is also a valuable resource in helping SIRIM gain the necessary experience and know-how, and understand the steps that need to be taken.

“We discovered that we needed to find the means to get the gas from mill to user. This led to SIRIM fabricating a lightweight, composite cylinder that can transport the gas safely and easily in remote areas and off-road conditions,” Azhar shared.

Tapping New Possibilities

The potential for the growth of BioNG as an alternative energy source in Malaysia is there. As a leading producer of palm oil, the country has an abundance of POME resources, for one. Nevertheless, it is important to ensure that the right ecosystem is available.



Azhar Abdul Raof,
Director of Industrial Centre
of Innovation in Bio Natural Gas



Setting the Standards for BioNG

As Malaysia is in the initial stage of its journey as the first and only country producing BioNG in the region, it is imperative to establish a set of guidelines that relevant industry players can use as benchmarks. SIRIM has been mandated with this responsibility.

In addition to its direct involvement in pioneering the industry, SIRIM also has a dedicated arm with extensive experience and expertise in developing standards for the nation, SIRIM STS Sdn Bhd; thus giving it the advantage of having the capabilities as well as in-the-field knowledge to develop a standard that will become a key building block for an all-encompassing BioNG ecosystem in the country.

The primary objective of the BioNG Standard is to provide the relevant stakeholders with necessary information on the fuel quality for BioNG vehicles required to develop and operate compressed natural gas vehicle equipment successfully.

The committee for the formulation of the standard for BioNG is headed by Azhar. According to him, the process kicked off with the formation of the committee, with members comprising various industry experts, who would get together to discuss the important details for the preliminary draft.

"I identified and invited several people who would be able to contribute their expertise to be part of the team. These include those from related associations, such as natural gas associations, academia, gas companies, waste producers, technology providers and vehicle operators," he said.

A Detailed Process

From the discussion, a proposal was then drawn out to start the standard development procedure. As there are no similar standards within the ASEAN region specifically, the committee utilised existing international standards such as ISO and EN as its point of reference for the preliminary drafting stage.

Although this standard is drafted with BioNG for vehicular use in mind, it can also be adopted for other applications, such as boilers and furnaces. The only exception is BioNG in gas pipelines, which will require a different standard.



In pioneering the BioNG sector, SIRIM is involved across its entire value chain – from purification and production to distribution, utilisation and standards development as well as the testing and verification process.

"This is our main target – to establish an ideal ecosystem that can enable its growth," said Azhar. "We have the right technology and equipment. Now, we are also looking into the integration of the various systems in order for the BioNG industry to be able to operate efficiently".

With the demo plant, SIRIM is able to show the industry players the possibilities of BioNG and how they can go about reaping its benefits. "We welcome them to visit and learn from it. After all, they are the ones who will be taking the next step in driving the BioNG industry towards expanding Malaysia's green economy potential," enthused Azhar.



We want to ensure that the gas is not harmful to the vehicle and the engine, for one. We must also ensure that the gas emitted is not dangerous. This is not a problem when it comes to POME as the gas emitted from that is not toxic; but it can be a challenge when it comes to domestic (household) waste.



The primary objective of the standard for BioNG is to provide the relevant stakeholders with necessary information on the fuel quality for BioNG vehicles required to develop and operate compressed natural gas vehicle equipment successfully.

Safety is paramount and the standard must be able to protect both the industry players and consumers. As such, the standard needs to have a balanced perspective in covering various aspects like material use and corrosion issues.

“For example, consumers will want high quality gas. But if the parameters of the standard indicate too high a percentage of methane content, it might become too costly and not feasible for the industry to abide to it,” explained Azhar.

Among others, the standard focuses on the level of allowable impurities in the gas. “We want to ensure that the gas is not harmful to the vehicle and the engine, for one. We must also ensure that the gas emitted is not dangerous. This is not a problem when it comes to POME as the gas emitted from that is not toxic; but it can be a challenge when it comes to domestic (household) waste,” he said.

These are among the issues that are deliberated upon during the second stage of the standards development. Once the committee is ready, the draft standard is then opened to the public to get feedback and advice from the stakeholders. This is typically done online or at dedicated workshops. Depending on the feedback obtained, it might be necessary to go back to the drawing board to ensure that all pertinent matters are properly addressed.

“Depending on the complexity of the issues, the third stage can be a lengthy process,” acknowledged Azhar. “Once everything is ironed out satisfactorily, the standard will then be finalised and approved.”

The standards development process for BioNG is currently at this stage, and it is anticipated that the standard will be ready to be rolled out by the end of the year.



A Wide Scope

While this standard for the BioNG industry is within a local context, Azhar foresees that it will help the industry progress in the regional and international markets.

"With the standard, there will be certain guidelines that our local technology developers, for example, will be able to comply with; they will have the necessary benchmark to help them identify the relevant ranges," he said.

There are many aspects to look into when developing a standard. For example, in the BioNG industry, there may need to be a standard for gas converters to ensure that they are installed safely.

"It's a work in progress. You need to have a good understanding of the industry. As we gain more hands-on experience and exposure in the field, we find more aspects that will benefit from having regulations, and that is where standards will come in handy," revealed Azhar.



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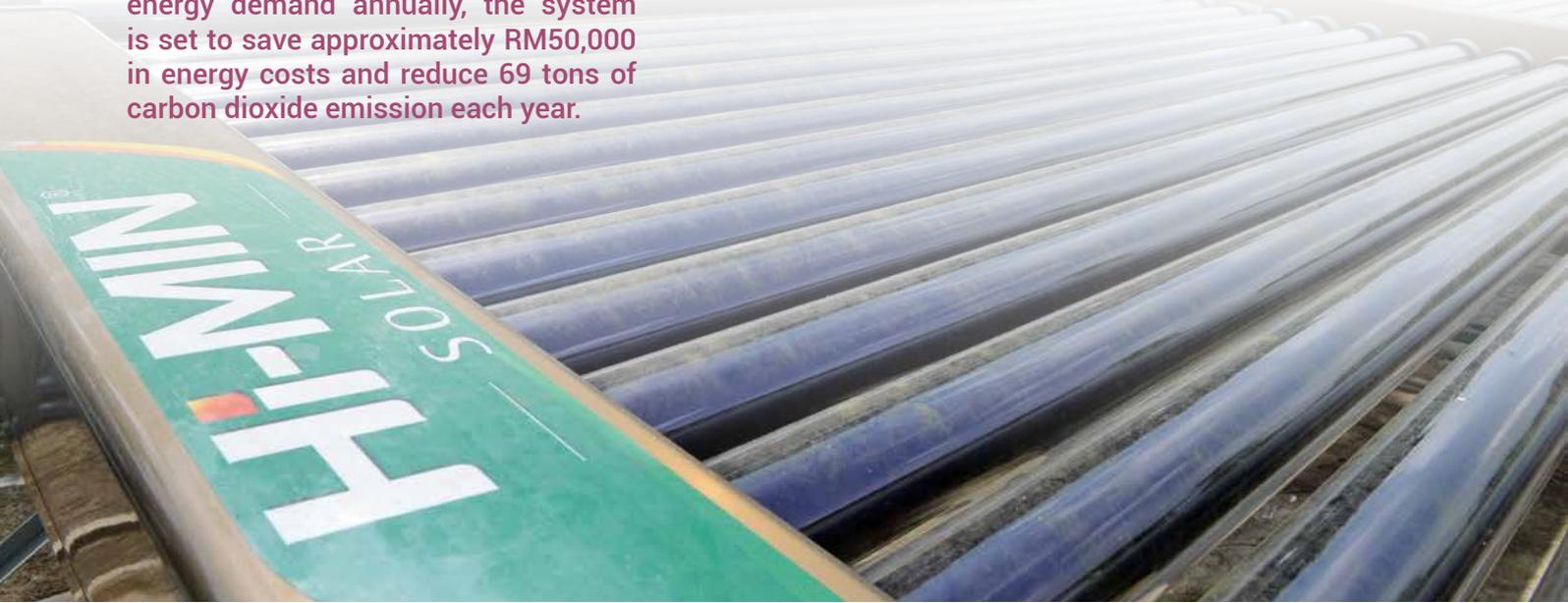


To find out more or to obtain updates on the progress of the standard, please visit <http://www.sirimsts.my>



Solar thermal energy is fast gaining popularity in Malaysia. SIRIM is leading the way, having successfully introduced a Solar Thermal System at PPNJ Poultry and Meat Sdn Bhd recently. The system has already garnered awards at national and regional levels. With the ability to deliver 100,000kWh of energy demand annually, the system is set to save approximately RM50,000 in energy costs and reduce 69 tons of carbon dioxide emission each year.

Solar Thermal: Alternative Solution to address Energy Costs



If there is one type of energy that Malaysia has plenty of, it is solar energy, thanks to the country's strategic location right at the equator. While solar photovoltaic (PV) energy has been steadily gaining prominence, its lesser-known cousin, solar thermal energy, has also been discovered to have immense potential.

Malaysia is no stranger to harnessing solar thermal energy, which has been used for domestic hot water systems for the past three decades. Now, the country is ready to focus on its potential in the industrial sector.

Solar thermal energy basically converts energy from the sun into heat, which is then transferred to a heating system. The heat can thereafter be used for a wide array of applications, such as industrial process heating, solar cooling and power generation, on a large scale.

Cooling with Heat

Solar cooling is a promising area of solar thermal energy. Using the appropriate technology, such as an absorption chiller, heat generated by the sun can be used for space cooling purposes.

Nearly 70% of the total energy consumption of industries in Malaysia is being channelled for heating purposes, according to the National Energy Balance Report 2016.

"We have an abundance of solar energy that is free, green and easily accessible. Why not capitalise it for our advantage? After all, we are right at the equatorial line. If Europe, with its temperate climate, can successfully harness solar energy, what more in Malaysia?" enthused Mohd Fauzi Ismail, Director of SIRIM's Industrial Centre of Innovation in Energy Management.



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Efficiency Counts

While solar PV energy is often considered to be the most popular form of renewable energy in Malaysia, in terms of efficiency, solar thermal energy promises to hold more potential. "The energy conversion rate of solar PV is only 20% due to the complex processes required for it to be converted to electricity. On the other hand, as the solar thermal conversion is direct, a solar thermal system can harvest nearly 80% of the solar energy it receives!" exclaimed Mohd Fauzi.

Three industrial subsectors have been identified as major thermal energy consumers: iron and steel, non-mineral products and food & beverage. The first two instances would typically require high temperature process of above 400°C. As the process temperature needs for the food & beverage industry are typically being below 100°C, however, this can be supplied by solar thermal technology.

In fact, a study done by PricewaterhouseCoopers has revealed that the solar thermal capacity potential for the food & beverage industry is highly significant. Two other subsectors with high thermal energy needs that could benefit from solar thermal energy are hotels and hospitals. "These subsectors use a lot of hot water – for bathing and cleaning, in the kitchen for food preparation, and even when doing laundry; hospitals especially need high temperatures to get rid of germs," explained Mohd Fauzi.



The energy conversion rate of solar PV is only 20% due to the complex processes required for it to be converted to electricity. On the other hand, as the solar thermal conversion is direct, a solar thermal system can harvest nearly 80% of the solar energy it receives!

The Big Picture

The advantages afforded by solar thermal energy are plenty. For one, it offers the possibility of significant savings for industries, which will not need to rely fully on fossil fuels for their energy needs. The surrounding communities would stand to gain with the creation of more job opportunities and a skilled workforce. This is also in line with the nation's commitment to reduce the percentage of the country's greenhouse gas emissions toward mitigating climate change.

"We are creating a whole new industry, so I definitely see people, industries and the entire country reaping the benefits from this," Mohd Fauzi elaborated.

Nevertheless, the solar thermal energy sector in Malaysia still has far to go. As it is a relatively new advancement in the country's renewable energy sector, there is currently not enough information on its efficacy or the technological know-how on its application. As such, there needs to be an increase in awareness of its potential. "Many

people are concerned that solar energy is not a reliable source of energy as it is only available during the day. What they need to know is that solar energy, and solar thermal energy specifically, can be stored, so it can be utilised whenever heat is needed," Mohd Fauzi clarified.

As with any new technology, the initial investment can also be expensive. This is compounded by a difficulty in obtaining financing as financial institutions may not have enough data to understand the possible returns solar thermal energy offers.

This is where endeavours by the government to promote this technology could prove effective. "Currently, Malaysia has policies on renewable energy, but not solar thermal energy in particular. The government could offer various incentives, such as green tax exemptions, to promote this new technology," said Mohd Fauzi.

Another issue faced is a lack of skilled manpower. "We need people who are well trained and can look after the various solar thermal systems that are put in place," he continued.

Overcoming Barriers

As a leading name in research and innovation, SIRIM has been at the frontier of solar thermal technology from the start, with an ultimate aim of establishing a complete solar thermal ecosystem – from technology research and development to training, standards development and testing/verification.

"We are addressing the entire value chain, including the suppliers of materials for the various parts and components necessary. With everything in place, then we hope to bring the cost down, develop local expertise and improve the solar thermal industry further," Mohd Fauzi explained.

The process usually begins with an energy audit to see where the organisation currently stands in terms of energy consumption. Once this is established, SIRIM will then provide relevant recommendations and the organisation can see whether it wants to embark on the project or not.

SIRIM has the expertise to conduct the entire project. "It is not limited to just solar thermal, we can incorporate solar PV as well. Ideally, we want to help the organisation to save money and profit from the project," said Mohd Fauzi.

One of SIRIM's recent success stories is the solar thermal system it

set up for PPNJ Poultry and Meat Sdn Bhd. This award-winning system has the potential to significantly reduce energy consumption.

"In order to reach out to more people, we have to demonstrate that the project is viable. Only then can industry players be open to adopting it and we will be able to have a big enough market," said Mohd Fauzi.

To keep the momentum going, SIRIM will continue with similar projects in diverse sectors, including the development of 10 demonstration plants. This will convey the many applications of the technology.

SIRIM also plays an instrumental role in developing the people in the industry by holding workshops and seminars, and constantly engaging with stakeholders to find out their views on the matter and address concerns that may arise.

Additionally, SIRIM is an active participant in various green energy communities to ensure that the solar thermal footprint is well embedded in various green initiatives at national level.

"This is not a one-man show, it's not just SIRIM doing it alone," quipped Mohd Fauzi. "It's a combined effort involving many agencies and ministries working together to pave the way for greater success."

The Next Step

While awareness of the potential of solar thermal energy as a green energy is increasing, it still hasn't reached the masses optimally. To facilitate, this, SIRIM is coming up with a solar thermal roadmap for Malaysia's industries. This national-level project is funded by the Global Environment Facility (GEF) and implemented by the United Nations Industrial Development Organization (UNIDO), with SIRIM as the lead executive agency.

"Once this is established, I believe we can expect better acceptance from industry," said Mohd Fauzi, who identified governmental support, particularly in policy and funding matters, to be an integral component toward making solar thermal energy a "mainstream" form of energy.

Meanwhile, SIRIM will continue its endeavours in undertaking research and development, adopting best practices and international standards, and conducting capacity-building to develop workforce in this area. This will hopefully enhance learning and adoption of solar thermal technology in the future.

"To decrease greenhouse gases, we need to include both renewable energy and energy efficiency. You don't just use green energy, but you have to use it effectively.

"There are so many industries out there, and solar thermal energy is a viable option for many of the industrial processes. It is, after all, cheap and easily available," declared Mohd Fauzi.



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PPNJ – A Solar Thermal Success Story

PPNJ Poultry and Meat Sdn Bhd produces fresh cuts and processed chicken products, processing up to 12,000 birds daily. A dedicated electric steam boiler used for the de-feathering process would consume a lot of energy, costing around RM12,000 in electricity costs each month.

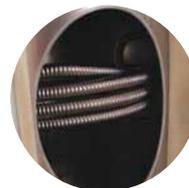
SIRIM came in to help the company establish Malaysia's first industrial-scale solar thermal plant. For this project, it was essential to ensure that the temperature could be maintained at a consistent temperature of 60°C to optimise the de-feathering process. The system designed has been performing well to date, and has the potential of reducing electricity usage for the scalding process by up to 90%.

Comprising evacuated tubes, a hot water storage tank and heat exchanger, three water pumps and a user-friendly automated control system, this system requires less maintenance compared to the electric boiler, and is expected to reduce the operational cost of producing hot water in the long term.

The system is a winner of the National Energy Award this year, and the first runner-up for the ASEAN Energy Award as well.



SIRIM will continue its endeavours in undertaking research and development, adopting best practices and international standards, and conducting capacity-building to develop workforce in this area. This will hopefully enhance learning and adoption of solar thermal technology in the future.



Mohd Fauzi Ismail,
Director of Industrial Centre
of Innovation in Energy
Management



Assuring Compliance with Environmental Requirements

With the Malaysian government increasing the momentum of its environmental conservation initiatives to enhance its global competitiveness, SIRIM QAS International Sdn Bhd is doing its part in supporting these endeavours, and more!



Within an increasingly globalised marketplace, coupled with an international focus on building a sustainable economy, the demand rate for top-notch testing, inspection and certification services has been expanding. As Malaysia's leading testing, inspection and certification body, SIRIM QAS International serves a wide range of industries, providing one-stop solutions in these areas both locally and globally.

SIRIM QAS International is also part of IQNet, the largest network of certification bodies in the world. "This means that we not only have access to an international customer base but are also able to continuously update our certification scheme services to move in tandem with the global marketplace and our pursuit for the improvement of environmental and customer safety and quality," explained Mohd Azanuddin Salleh, the Managing Director of SIRIM QAS International.

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Raising the Bar of Excellence

SIRIM QAS International

A subsidiary of SIRIM Berhad, SIRIM QAS International was established in 1997. With a wealth of experience and expertise under its belt, the organisation provides a myriad of internationally recognised testing, inspection and certification services to local and international customers from a wide cross-section of the economy.

IQNet

Headquartered in Switzerland, IQNet is an international certification network with nearly 40 partner certification bodies and over 200 subsidiaries worldwide, making it the most extensive and reputable network of certification bodies worldwide.



Green Touch

Among others, SIRIM QAS International offers a variety of green certification schemes. These include the ISO 14001 Environmental Management System; Product Carbon Footprint Scheme and ISO 50001 Energy Management System, which provides a verification of companies' efforts in reducing their energy consumption as well as greenhouse gas emissions.

There is also the home-grown SIRIM eco-label mark, which communicates the product's environmental benefits to consumers. "Presently, this is widely used as a marketing tool by businesses," shared Mohd Azanuddin.

SIRIM's eco-labelling scheme, which is fast gaining ground among the country's industry players, was developed via its membership in the Global Ecolabelling Network (GEN). According to the scheme, the product is independently tested and verified against pre-determined criteria before it can adopt the eco-label mark. This is an internationally recognised standard. "GEN is an internationally ranked organisation that was founded with the aim of improving, promoting and developing the labelling of products and services worldwide. Being a member of GEN is a testament to the credibility of SIRIM's eco-labelling scheme, putting it on par with other international eco-labelling schemes," he explained.

Other similar schemes under SIRIM QAS International include the Photovoltaic Module Certification that ascertains the reliability and safety of photovoltaic modules and the Modular Coordination Verification that is used for industrial building systems to improve productivity.

Additionally, SIRIM QAS International also has an energy-efficiency testing laboratory, which is capable of testing various electrical appliances like refrigerators, air conditioners and lighting, as well as providing other industrial testing services in areas such as sound absorption, thermal transmittance and productivity, heavy metals and toxicity.

An Exponential Growth

"I foresee that the demand for testing, inspection and certification services will keep increasing. The world is getting smaller; and with the increase in globalisation, there will be an increase in trade between countries. This will necessitate compliance with international standards," expounded Mohd Azanuddin.



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Mohd Azanuddin Salleh,
Managing Director of
SIRIM QAS International





Following the rollout of the 17 Sustainable Development Goals (SDGs) by the United Nations in 2015, recent years have also witnessed a heightened emphasis on more stringent standards, particularly those pertaining to health and the environment.

Adherence to various testing, inspections and certifications will increase acceptance of products as well. Manufacturers that wish to widen their reach internationally will have to comply with strict global standards to gain entry.

Additionally, with consumerism becoming increasingly prevalent, coupled with the expansion of social media platforms, end-users have become more discerning in their purchases. This could lead to an increase in the necessity of legal compliance to protect both manufacturers and consumers. As



As part of the SIRIM Group, SIRIM QAS International is well positioned to tap into the strengths of SIRIM, such as its industrial research and standards development capabilities, to offer one-stop solutions to meet the industry's needs.

Best Partner for Innovation

such, it is important to ensure that products in the marketplace follow relevant standards.

Distinct Advantage

SIRIM QAS International has a competitive edge when it comes to the provision of testing, inspection and certification services. For one, the SIRIM name is synonymous with high standards, quality and safety. As part of the SIRIM Group, SIRIM QAS International is well positioned to tap into the strengths of SIRIM, such as its industrial research and standards development capabilities, to offer one-stop solutions to meet the industry's needs.

Furthermore, thanks to its extensive ties with relevant authorities, industries and certification bodies as well as multiple accreditations, including with the Department of Standards Malaysia and UK

Accreditation Services (UKAS), across the world, SIRIM QAS International is internationally recognised.

SIRIM QAS International also has numerous branches across the country. "In fact, you could say that our geographical reach as a testing, inspection and certification service provider is the best in the country!" exclaimed Mohd Azanuddin.

Above all, SIRIM QAS International is committed to ensuring that their customers' needs are met. "We aim to take the hassle of the testing, inspection and certification processes away so that the manufacturers can focus on their businesses," he continued.

Enhancing Customer Experience

SIRIM QAS International is moving towards becoming a customer-first organisation. "To do so, we are adopting a customer-centric mindset and increasing the breadth, depth and quality of services being offered," explained Mohd Azanuddin.

The organisation's endeavours include wider use of digital technology in testing, inspection and certification areas, for example, remote inspection using drones and the use of big data analytics, predictive modelling and

preventive maintenance to benefit manufacturers.

In line with one of the eight strategic thrusts forming part of SIRIM Group's 10-year strategic plan and the SIRIM QAS International client charter, SIRIM QAS International is also committed to being more accessible to customers. This includes establishing a 24/7 platform that allows customers to check the status of their applications and testing, book an appointment for SIRIM QAS International's services, obtain updates and get prompt and efficient feedback on any enquiries that they might have.



The testing, inspection and certification business commands a big market. Globally, it's growing between four and five per cent annually, and has an estimated value of around €200 million.

Optimistic Future

Mohd Azanuddin believes that the potential for growing the country's testing, inspection and certification capabilities is there, and looks forward to expanding SIRIM QAS International's market reach globally.

Just last year, a branch was set up in Bahrain, which will act as a platform for SIRIM QAS International to increase its prominence in the Middle East. The organisation has also been officially recognised as a notified body under the Gulf Cooperation Council (GCC) and aims to venture into China and Indonesia in the near future.

"The testing, inspection and certification business commands a big market. Globally, it's growing between four and five per cent annually, and has an estimated value of around €200 million," revealed Mohd Azanuddin.

"Ultimately, we aspire to go beyond Malaysia. We want to expand our base internationally while ensuring that the domestic market continues growing at a reasonable pace. We want to make sure that we are able to give the industries and our customers the best services!" he declared.



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