



SIRIM *Link*

06

Dato' Indera Ir. Dr. Ahmad Sabirin Arshad

Unlocking the Potentials of Sustainable Energy

11

Aernida Abdul Kadir

Achieving Energy Excellence

23

Abdul Halim Yacob

Future-proofing Local Businesses

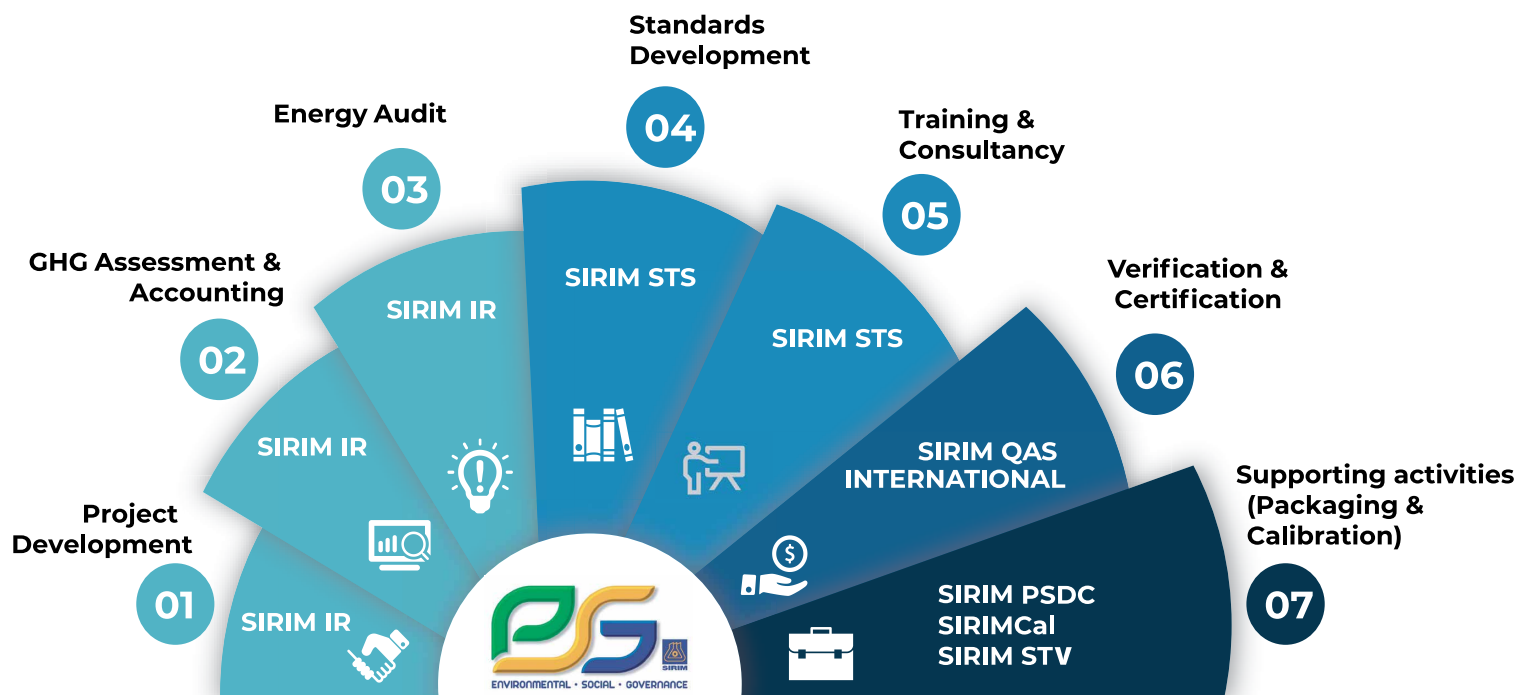


Making Energy
SUSTAINABLE



SIRIM

Driving ESG to Advance The Nation



Your Partner For Innovation



SIRIM.Bhd



sirim_berhad



SIRIM Berhad



@SIRIM_Berhad



SIRIM Berhad

www.sirim.my

Harnessing an Energy- Efficient Future

Energy is an essential aspect of modern-day living, powering practically every facet of our daily routines from sunup to sundown. However, with a rapidly growing global population, it is becoming increasingly evident that our finite energy resources are not a sustainable solution. This has given rise to a pressing need for proper conservation and management practices to ensure the sustainability of our energy usage – both today and in the future.

Efforts to achieve energy efficiency are not only an integral part of this journey; they also necessitate the collective efforts of everybody involved – from individuals to industry players and governments. There are many components that play an important role in making this happen. This issue of SIRIMLink brings some of them to the limelight.

From tangible innovations like energy storage and smart and intelligent packaging to minute ones like microalgae biofuel to those that inspire improved and more efficient ways of energy management, we hope that shining the spotlight on some typical and not-so-conventional solutions will help you to rethink energy efficiency in your daily operations. Together, let us head towards a more sustainable world!

ADVISOR

Dato' Indera Ir. Dr. Ahmad Sabirin Arshad

CHAIRPERSON

Nor Azlan Mohd Ramli

MEMBERS

Aliza Zainal Munir
Dr. Azizan Abdul Aziz
Hasmafatiha Harun
Irene Safinaz Hassan
Mohd Zurani Abdul Wahab
Nurazlina Ismail
Roslina Harun
Roslina Abdul Wab
Syazrie Adley Nor Azman
Tey Yok Pee

PUBLISHED AND PRINTED BY

SIRIM Berhad
1, Persiaran Dato' Menteri
Section 2, 40700 Shah Alam, Selangor

*SIRIMLink is an official publication of SIRIM Berhad.
The bulletin is distributed free to our clients and
associates, business and research establishments.*



Copyright © SIRIM Berhad.

For further information on the articles featured in this magazine, please contact:
Strategic Communication Section
SIRIM Berhad

Tel: 03-5544 6772
Fax: 03-5544 6745

Email: publications@sirim.my

vol 2 2023

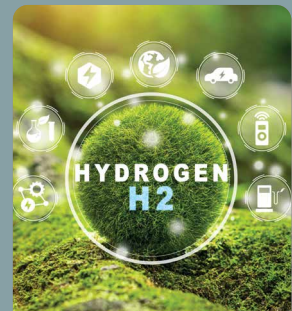
highlights



DATO' INDERA IR. DR. AHMAD SABIRIN ARSHAD
President and Group Chief Executive Officer

06

Unlocking the Potentials of Sustainable Energy



AERNIDA ABDUL KADIR
Principal Auditor, SIRIM QAS International Sdn Bhd (SIRIM QAS International)

11

Achieving Energy Excellence





DR. ZOOL HILMI IBRAHIM
*Researcher, SIRIM's Industrial
Biotechnology Research Centre (IBRC)*

15

Harnessing the Power of
Microalgae as a Biofuel



DR. ABDUL HAKIM HASHIM
*Director of the Industrial Centre of
Innovation (IC-I) of Advanced Energy
Storage, SIRIM Industrial Research*

19

Advancing Energy
Storage Solutions



ABDUL HALIM YACOB
*Head of the Packaging Design
Section of SIRIM's Packaging
and Security Design Centre (PSDC)*

23

Future-proofing
Local Businesses

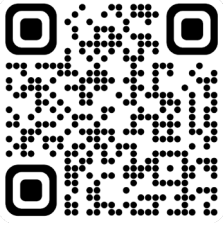


SALMAH MOHD NORDIN
*Head of Standards Development
Section, SIRIM STS Sdn Bhd (SIRIM STS)*

27

Warming up to
Solar Water Heating





Sustainability is a crucial pillar when it comes to addressing universal challenges such as climate change, environmental vulnerability and, of course, energy security. As Malaysia strides forward in exploring energy sustainability, SIRIM plays an instrumental role in forging a smooth and seamless path for the nation's journey.

Unlocking the Potentials of Sustainable Energy

Dato' Indera Ir. Dr. Ahmad Sabirin Arshad
President and Group Chief Executive Officer



As part of our national ambition, we are diversifying our energy sources. Initiatives such as the promotion of electric vehicles (EVs) and other sustainable practices are undoubtedly steps in the right direction as we move forward.

By 2050, Malaysia's population is expected to rise to 40.7 million people with its economy nearly tripling in size. In tandem with this, the country's primary energy supply is anticipated to increase by 60% to reach 6.7 exajoules (EJ), up from 4.1 EJ in 2018. Electricity will comprise up to 40% of the final energy consumption, reflecting the additional electricity demand required to power the transport sector and green hydrogen production.

The increasing importance of renewable energy in this scenario is undeniable. Boasting significant untapped potential in renewable energy resources, Malaysia is well-poised to offer local, cost-effective alternatives to fossil fuels while contributing to energy source diversification.

The country recently announced its aim to reach net-zero emissions by as early as 2050, which is reflected in its latest National Energy Policy, and continues to refine a long-term low-emission development strategy. "As part of our national ambition, we are diversifying our energy sources. Initiatives such as the promotion of electric vehicles (EVs) and other sustainable practices are undoubtedly steps in the right direction as we move forward," said Dato' Indera Ir. Dr. Ahmad Sabirin Arshad, President and Group Chief Executive Officer of SIRIM.

Reflecting on Malaysia's energy landscape, a promising and transformative shift is evident. Once considered a "sunset industry", green energy has now emerged as a thriving sector, shared Dato' Indera Ir. Dr. Ahmad Sabirin. For the nation to forge a more resilient and sustainable future, it is imperative that governments, businesses and individuals wholeheartedly embrace new possibilities within the green sector.

The objective is to ensure that one-fifth of Malaysia's energy demands can be met through renewable sources, including bioenergy, solar thermal and hydrogen, by 2050. This represents a substantial shift from the current level of renewable energy usage of just one per cent.

BY 2050

1/5

OF MALAYSIA'S ENERGY DEMANDS CAN BE MET THROUGH RENEWABLE SOURCES



BIOENERGY



SOLAR THERMAL



HYDROGEN

Within this transition, bioenergy will be a significant contributor to Malaysia's evolving energy landscape, while hydrogen will serve as a complementary solution to help achieve the nation's climate goals. Green hydrogen is projected to constitute up to five per cent of the total final consumption, playing a pivotal role in reducing carbon emissions in specific industrial sectors and catering to the growing export market for green hydrogen in the Asia-Pacific region.

Diversifying Energy Sources

Solar energy resources are presently a top contender in terms of renewable energy usage in the country. However, Dato' Indera Ir. Dr. Ahmad Sabirin looks forward to expanding the focus further.

"The current trend in Malaysia involves the use of solar energy, with a widespread adoption of solar roofing and solar thermal systems across many industries. Nevertheless, we are focusing on extending our reach to include the hydrogen economy, as we aim to establish robust hydrogen ecosystems and ensure ample support for future developments," he commented.

The current trend in Malaysia involves the use of solar energy, with a widespread adoption of solar roofing and solar thermal systems across many industries. Nevertheless, we are focusing on extending our reach to include the hydrogen economy, as we aim to establish robust hydrogen ecosystems and ensure ample support for future developments.



Dato' Indera Ir. Dr. Ahmad Sabirin remarked that Sarawak stands as a pioneering state, leading the way in the development of a green hydrogen economy. The state's efforts have materialised into sustainable ecosystems, featuring hydrogen-powered trains that run within the city of Kuching. Collaborating with the Sarawak Economic Development Council (SEDC), SIRIM has embarked on this journey to ensure its integral role within the broader national hydrogen economy ecosystem.

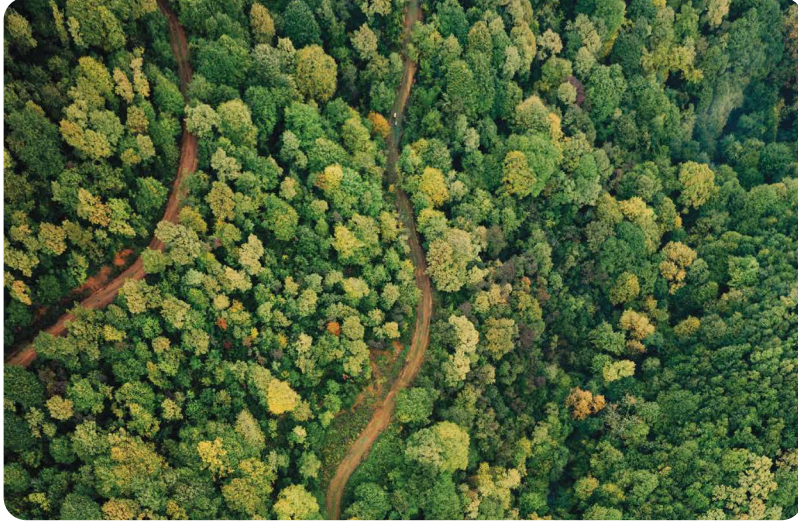
"Diversification is always very important for our country. As Malaysia moves forward in the new economy, we cannot afford to put all eggs in one basket. It is very crucial that we all embrace these new changes and make sure that we also adapt to the new challenges to make sure that the energy is conserved," said Dato' Indera Ir. Dr. Ahmad Sabirin.

Overcoming Obstacles

With Malaysia heading down the path towards embracing low-carbon nation status, the main challenge lies in the necessity of conducting an initial audit before engaging in any activities.

Diversification is always very important for our country. As Malaysia moves forward in the new economy, we cannot afford to put all eggs in one basket. It is very crucial that we all embrace these new changes and make sure that we also adapt to the new challenges to make sure that the energy is conserved.

"I have always advocated for the significance of conducting an audit to establish our current position. It is essential to assess our current carbon status, as we lack clarity whether Malaysia is a low carbon country, operates at a carbon deficit or functions as a carbon sink," shared Dato' Indera Ir. Dr. Ahmad Sabirin.



Malaysia possesses abundant forests, which serve as significant carbon sinks while generating substantial oxygen. States such as Pahang, Terengganu, Kelantan, Sabah and Sarawak have substantial forest cover, playing a crucial role in carbon absorption; this is further complemented by more than 22 plantations across the country that also contribute to carbon capture.

"If we haven't conducted a carbon audit, we lack a clear understanding of our current carbon status. Before launching new initiatives or investing in various projects, the initial step should be a carbon audit to assess our position. Once we have this information, we can formulate strategies, identifying which states need carbon reduction and which ones can provide for others," added Dato' Indera Ir. Dr. Ahmad Sabirin.

Two additional challenges include limited financial resources and budget constraints, which hinder the implementation of effective carbon reduction strategies. Resistance to change, often stemming from a lack of knowledge and experience in low-carbon technologies, is another significant obstacle. To progress, it is essential to persist in reducing carbon footprints in current and upcoming operations and to adopt a greater number of low-carbon technology solutions.

Energising Change

One way to facilitate a sustainable energy ecosystem is to incorporate essential sustainability factors into its reports for industries. This includes performing carbon emission calculations for these industries as part of their sustainability reports.

"This initial step is crucial in understanding the carbon emissions associated with every aspect of the industries' daily operations – even the commute to and from workplaces and homes, among other factors," said Dato' Indera Ir. Dr. Ahmad Sabirin.



If we haven't conducted a carbon audit, we lack a clear understanding of our current carbon status. Before launching new initiatives or investing in various projects, the initial step should be a carbon audit to assess our position. Once we have this information, we can formulate strategies, identifying which states need carbon reduction and which ones can provide for others.



SIRIM's role is to provide this foundational information to support industries in their sustainability efforts. "We want to position SIRIM as the national carbon registrar for the country," added Dato' Indera Ir. Dr. Ahmad Sabirin.

To do so, SIRIM collaborates closely with government ministries and agencies to assist in achieving national development goals. Its primary commitment lies in helping the government establish a resilient and sustainable green energy sector in Malaysia. For example, SIRIM Industrial Research specialises in creating total solutions for various industries, particularly in energy efficiency, renewable technology and energy storage.



We want to position SIRIM as the national carbon registrar for the country.

SIRIM's core mission is to support Malaysia in adopting efficient, eco-friendly and technologically advanced energy solutions for a sustainable future.



"SIRIM's core mission is to support Malaysia in adopting efficient, eco-friendly and technologically advanced energy solutions for a sustainable future.

"Industries and states often struggle with knowing where to begin in terms of sustainability efforts. We recognise the need to raise awareness, provide education and offer training to equip them with the knowledge and tools to initiate and sustain such efforts effectively," explained Dato' Indera Ir. Dr. Ahmad Sabirin.

Among others, SIRIM has developed environmental, social and governance (ESG) standards, especially for small and medium enterprises (SMEs). Achieving ESG compliance is essential for international exports, as many Western nations now demand it. By fostering ESG compliance, SIRIM can help Malaysian industries to remain competitive and export their products worldwide.

Charging Forward

The current lithium-ion battery (LIB) recycling market is valued at around US\$1.7 billion and is set to grow substantially. SIRIM has joined forces with a local company to establish LIB recycling plants in Malaysia. This initiative aims to create a circular economy ecosystem, addressing the environmental impact of illegal LIB processing. It supports Malaysia's sustainable development goals and the UN's 2030 Agenda.

"We're partnering with the private sector to recycle and refurbish electric bike batteries, promoting a circular economy to reduce waste and enhance sustainability. Recycling is vital; it's the key to a better future," said Dato' Indera Ir. Dr. Ahmad Sabirin.

Many discarded LIBs pose environmental risks, and recycling them is essential to reduce pollution and preserve resources. "The key objective is to maximise the utility and sustainability of batteries in real-life

We're partnering with the private sector to recycle and refurbish electric bike batteries, promoting a circular economy to reduce waste and enhance sustainability. Recycling is vital; it's the key to a better future.



applications. SIRIM welcomes partnerships to enhance local e-waste recycling capabilities," said Dato' Indera Ir. Dr. Ahmad Sabirin.

We have a distinct advantage that we need to leverage. Malaysia boasts a substantial number of engineers, both from our public and private universities, and the world is increasingly seeking our engineering expertise. This, coupled with our robust industries and skilled workforce, positions us favourably for the future. It is essential that we capitalise on these strengths as we move forward.

Paving the Way for EVs

Malaysia's Low Carbon Mobility Blueprint 2021-2030 sets ambitious goals for the integration of EVs. The plan envisions a significant increase in electric motorcycles and electric cars, aiming for a 15% share of the former and 20,000 of the latter by 2030. As electric vehicles gain momentum, the demand for public charging infrastructure is also set to soar, with projections of up to 2.9 million electric cars and over 150,000 public chargers needed by 2030.

"We have a distinct advantage that we need to leverage. Malaysia boasts a substantial number of engineers, both from our public and private universities, and the world is increasingly seeking our engineering expertise. This,



SIRIM is a part of numerous EV-related projects such as:



EV Retrofit for the Logistics Industry



Electric Aviation Project



eBoat Project for electric mobility on water



National Rechargeable Battery Testing Centre, which has been approved for implementation in 2024

coupled with our robust industries and skilled workforce, positions us favourably for the future. It is essential that we capitalise on these strengths as we move forward," said Dato' Indera Ir. Dr. Ahmad Sabirin.

SIRIM plays a crucial role in the EV industry by providing design approval testing and calibration services for EV charging systems, ensuring fair and transparent transactions. It adheres to the National Measurement System Act 2007 (Act 675).

Additionally, SIRIM focuses on standards research and development, creating guidelines for certification to regulate battery products and charging systems. This guarantees that high-quality batteries are used in Malaysian EVs. SIRIM's plans also include establishing an accredited laboratory for testing battery safety performance, pioneering the first standard in the ASEAN region.

Future-friendly

With the majority of the world looking towards net-zero emissions by 2050, the global demand for low-carbon fuels like bioenergy, biofuels, e-fuels and hydrogen is growing. Malaysia has the potential to become a reliable supplier of these eco-friendly fuels. SIRIM is at the forefront, with its expertise in renewable fuels.

SIRIM's journey began with the production of biogas and has led to advancements in green hydrogen. Notably, it has had success in projects such as pilot-scale bio natural gas (BioNG) production from palm oil mill effluent in 2012, the construction of a BioNG plant in 2018 with a daily capacity of 6,000m³, and the development of the world's first sago mill biogas plant in 2019. These accomplishments showcase SIRIM's vital role in Malaysia's transition to sustainable fuels.

A primary concern with hydrogen is its logistics and safe transportation, especially for green hydrogen production. Despite the challenges, there is the potential for Malaysia to tap into green hydrogen due to its abundant resources.

"We must harness the abundant resources at our disposal efficiently and recycle them. This not only enhances our energy security but also boosts our economy, ensuring that nothing goes to waste, transforming waste into energy and wealth," said Dato' Indera Ir. Dr. Ahmad Sabirin.

Finally, Dato' Indera Ir. Dr. Ahmad Sabirin doesn't rule out other energy sources, such as nuclear energy, which is well-known for its steady energy generation. "We're also looking into alternative sources like harnessing tidal waves and ocean currents, which have great potential for various projects. SIRIM is actively working on smaller-scale upgrades in this area," he shared.

"Change can be challenging, but it's a crucial part of progress. Just like how we transitioned from reading newspapers to online news, we can adapt when circumstances require it. The key is for both the public and governments to work together. It involves every sector of society, including industries. Achieving net-zero emissions by 2050 isn't just a lofty goal; it's something we can accomplish collectively as we keep progressing," concluded Dato' Indera Ir. Dr. Ahmad Sabirin.



Change can be challenging, but it's a crucial part of progress. Just like how we transitioned from reading newspapers to online news, we can adapt when circumstances require it. The key is for both the public and governments to work together. It involves every sector of society, including industries. Achieving net-zero emissions by 2050 isn't just a lofty goal; it's something we can accomplish collectively as we keep progressing.

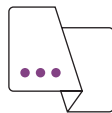




The ISO 50001

certification creates game-changing excellence and sustainable growth by empowering organisations to establish an efficient energy management system.

Achieving Energy Excellence



Aernida Abdul Kadir
Principal Auditor, SIRIM QAS International Sdn Bhd



From mitigating climate change by promoting efficient practices and transitioning to renewable sources to reducing greenhouse gas emissions, it is clear that effective energy management plays a vital role in curbing rising costs, environmental concerns and regulatory pressures. From an economic standpoint, it enhances energy security, reduces dependency on finite fossil fuels and stimulates economic growth through investment in renewable energy infrastructure.



Energy management is a critical aspect for industries as it optimises energy consumption, cuts costs and reduces environmental impact. By managing energy efficiently, industries can improve competitiveness and operational efficiency as well as contributing to sustainability. The benefits are evident, enabling better resource allocation, cost reduction, increased profitability and improved financial stability. Embracing sustainable energy practices helps organisations to meet environmental responsibilities and align with sustainability targets, enhancing public image and reputation.

The ISO 50001 certification offers an avenue for organisations to inculcate an efficient energy management system framework. Stemming from a request from the United Nations Industrial Development Organization (UNIDO), the ISO 50001 supports organisations across all industries to implement an energy management system to use energy more efficiently.

With the world speeding through industrialisation, urbanisation and technological advancements, managing energy resources is vital for sustainable development and global progress. "From mitigating climate change by promoting efficient practices and transitioning to renewable sources to reducing greenhouse gas emissions, it is clear that effective energy management plays a vital role in curbing rising costs, environmental concerns and regulatory pressures. From an economic standpoint, it enhances energy security, reduces dependency on finite fossil fuels and stimulates economic growth through investment in renewable energy infrastructure," said Aernida Abdul Kadir, Principal Auditor at SIRIM QAS International Sdn Bhd (SIRIM QAS International).

Prioritising energy management empowers societies to embrace a future powered by cutting-edge technologies, cleaner energy usage, and social progress for a healthier planet. It enhances industries' competitiveness and operational efficiency and contributes to a greener, more sustainable future.

“Obtaining a certification in energy management becomes an invaluable asset for industries, demonstrating their commitment to responsible energy practices, reducing carbon footprints and contributing to sustainable development. Businesses can allocate resources effectively, improving energy efficiency and reducing operational expenses, leading to increased profitability and financial stability,” added Aernida.

Towards Efficient Energy Management

Similar to environmental management and occupational safety and health systems, the ISO 50001 acknowledges the importance of energy management in various industries. The certification helps organisations understand their energy usage patterns and identify areas for improvement.

Obtaining the ISO 50001 certification has several benefits for businesses. It enhances energy awareness and management, and improves the overall business reputation. The businesses gain better understanding of different energy types and are guided in improving energy practices, promoting sustainability and efficiency.

Certified organisations benefit from a structured energy management approach involving all departments, which fosters shared responsibility and collaboration. This unified approach ensures a more effective energy management strategy compared to uncertified companies that often treat energy-related matters as separate.

“The certification also leads to increased top management involvement and general awareness. Certified organisations actively engage top management in energy management initiatives, enabling them to make informed decisions and monitor progress. This commitment drives continuous improvement in energy management practices,” shared Aernida.

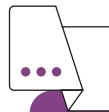
In a bid to help pinpoint significant energy usage areas, organisations conduct an energy review at the start of their journey towards implementing the energy management system. Once the environmental impact, significant energy users and improvement programmes have been documented, a Stage 1 audit is conducted by SIRIM QAS International to ensure compliance with standard requirements and to identify any necessary changes. SIRIM QAS International will also identify any overlying gaps between the clients’ documents and the ISO 50001 standard requirements.

Over the next few months, organisations implement the documented procedures carefully, including the improvements highlighted during the Stage 1 audit. This is followed by a Stage 2 audit by SIRIM QAS International to evaluate the effectiveness of the energy management system elements and ensure the standard requirements are implemented diligently in accordance to what is stipulated in the established procedure.

“Prior to the Stage 2 audit, it is expected that the organisations have conducted the Management Review that ensures top management commitment, progress assessment and resource provision to support energy management efforts. The organisations will report their achievements and address non-conformances as well as formulating a plan to move forward to ensure continual improvement towards achieving the energy management system’s overall goal,” explained Aernida.



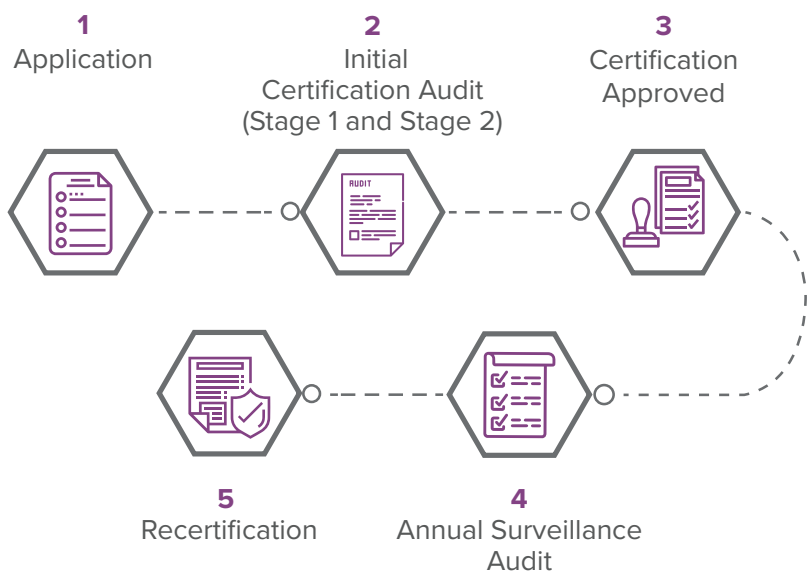
Obtaining a certification in energy management becomes an invaluable asset for industries, demonstrating their commitment to responsible energy practices, reducing carbon footprints and contributing to sustainable development. Businesses can allocate resources effectively, improving energy efficiency and reducing operational expenses, leading to increased profitability and financial stability.



The benefits of the ISO 50001 certification for organisations:

- Enhanced energy management practices
- Structured and inclusive objective for all departments
- Informed decision-making
- Reduced energy consumption
- Cost savings
- Improved operational efficiency
- Management of carbon footprint and improvement of sustainability commitment
- Enhanced work environment
- Future capital investment improvement

SIRIM QAS International's certification process is completed when the organisations have satisfactorily addressed any non-conformances from the Stage 2 audit, and when it is evident that the organisation is complying with the standard requirements of the energy management system.



The certification also leads to increased top management involvement and general awareness. Certified organisations actively engage top management in energy management initiatives, enabling them to make informed decisions and monitor progress. This commitment drives continuous improvement in energy management practices.

At SIRIM QAS International, we have a highly experienced and professional team of auditors who are competent in a wide range of sectors and able to provide expert service throughout the certification process. Besides that, we are also accredited by the Department of Standards Malaysia.



Extensive Expertise

"At SIRIM QAS International, we have a highly experienced and professional team of auditors who are competent in a wide range of sectors and able to provide expert service throughout the certification process. Besides that, we are also accredited by the Department of Standards Malaysia," Aernida said.

Regardless of the organisation's size or energy usage, SIRIM QAS International has the capability to assist clients from various sectors, including complex cases like golf resorts looking to manage energy usage during night golfing.

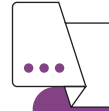
Aernida observes that many clients voluntarily embrace energy management systems and are improving practices and overall company performance. "There has been increasing acceptance of the ISO 50001 certification among the various industries; this could be due to the fact that many are now aware of the linkage between energy management systems and greenhouse gases and carbon footprint management. Leading organisations like Ranhill SAJ, Indah

Water Konsortium and Jabatan Kerja Raya, for example, have influenced others to adopt ISO 50001 by showcasing their success," she explained.

Encompassing two scopes, the energy management approach contributes to emission reduction and aligns with the Malaysia Energy Plan's objectives. Scope 1 includes energy sources like coal, petrol, diesel and natural gas, while Scope 2 covers electricity usage and consumption .

It is important to note that ISO 50001 involves understanding the connection between energy usage and environmental factors, where greenhouse gas emissions fall under environmental management, and energy consumption falls under energy management. Thus, it becomes an integral component of an organisation's environmental and social governance (ESG) responsibilities.

According to Aernida, "The ultimate goal is to encourage a shift towards a more sustainable business environment by prioritising energy management and adopting responsible practices aligned with ISO 50001 standards. SIRIM QAS International provides comprehensive data and guidance to support organisations in their journey towards sustainable energy management and environmental stewardship."



Why choose SIRIM QAS for the ISO 50001 certification

- Reputable brand
- National accreditation
- Stringent quality control
- Cost effective
- Local industry & market knowledge



The ultimate goal is to encourage a shift towards a more sustainable business environment by prioritising energy management and adopting responsible practices aligned with ISO 50001 standards. SIRIM QAS International provides comprehensive data and guidance to support organisations in their journey towards sustainable energy management and environmental stewardship.



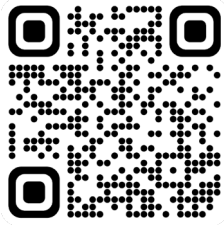
To find out how SIRIM QAS International can help your organisation obtain the ISO 50001 certification, kindly contact:

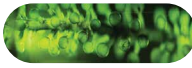
Aernida Abdul Kadir

+6019 365 9197

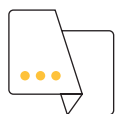
aernida@sirim.my

sirim-qas.com.my



With fossil fuels being a finite energy source, the race for alternative fuels has been gaining momentum in recent years. A potential contender is  microalgae.

Harnessing the Power of Microalgae as a Biofuel



Dr. Zool Hilmi Ibrahim
Researcher, SIRIM's Industrial Biotechnology Research Centre (IBRC)



Microalgae are a type of microorganism. However, they have chlorophyll, giving them plant-like characteristics. What is interesting about microalgae is that they are considered a potential alternative fuel that can be blended with fossil fuel or used on their own. Microalgae biofuel also has high productivity compared to seed oil or oil feedstock.



As the threat of fossil fuel depletion and global warming becomes more imminent, more countries around the world are seeking alternative fuels that can replace or supplement fossil fuels as primary energy sources. One such resource is microalgae.

Would microalgae biofuel be able to meet the escalating demand for energy? Dr. Zool Hilmi Ibrahim, Researcher at SIRIM's Industrial Biotechnology Research Centre (IBRC), thinks so. Dr. Zool has been conducting extensive research on numerous microalgae strains in Malaysia and finds it to be an ideal alternative fuel.

While there are many sources for biofuel, among those that are more well-known are seed oils derived from palm and sunflower. However, microalgae possess numerous characteristics that make them an ideal renewable energy resource.

"Microalgae are a type of microorganism. However, they have chlorophyll, giving them plant-like characteristics. What is interesting about microalgae is that they are considered a potential alternative fuel that can be blended with fossil fuel or used on their own. Microalgae biofuel also has high productivity compared to seed oil or oil feedstock," he said.



There are many sources of biofuel. The more prominent ones are derived from seed oil like:



>> palm oil



>> sunflower oil

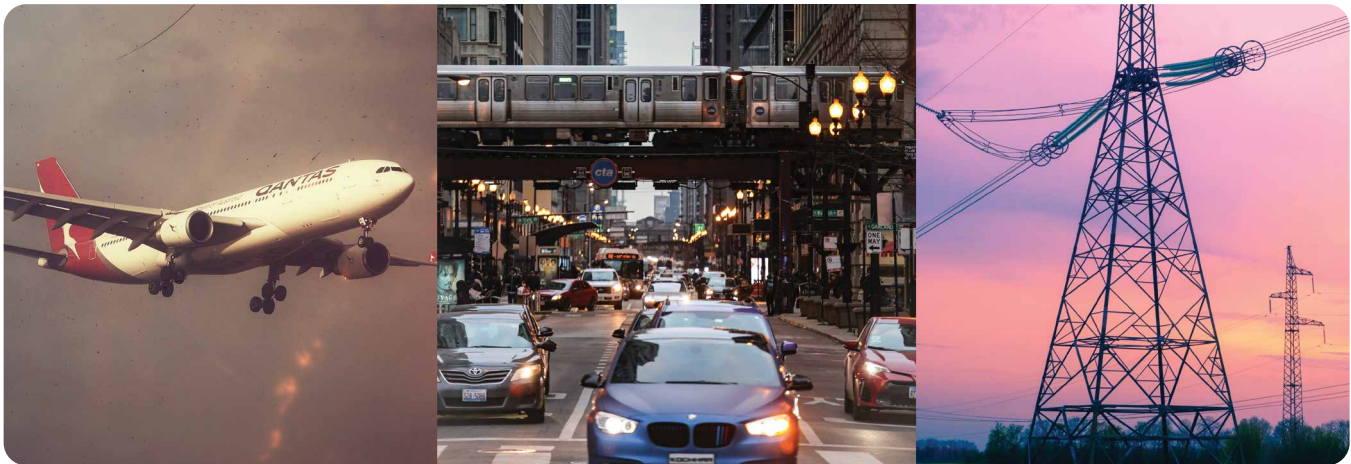


The microalgae cells can make energy and lipids, similar to how plants produce fruits and leaves. This can help to reduce our carbon footprint.

Microalgae can play a vital role in the energy ecosystem. The bio oil produced by microalgae can be filtered to produce many types of fuel grades, including biodiesel, bioethanol and biogas after the refinery process. This can help to lessen reliance on fossil fuels.

Furthermore, due to its chlorophyll content, microalgae is able to convert carbon dioxide into energy and lipids via photosynthesis. "The microalgae cells can make energy and lipids, similar to how plants produce fruits and leaves. This can help to reduce our carbon footprint," added Dr. Zool.

The aviation, transportation and power generation industries are three main sectors that emit extraordinarily high levels of carbon dioxide and could, therefore, stand to benefit from utilising microalgae as biofuel, according to Dr. Zool. With developed nations starting to adjust their regulations to ensure more environmentally friendly operations in these industries, the race to find alternative fuel has become more critical.



In the aviation industry, for instance, under the approved text, suppliers would be required to blend a minimum of two per cent of sustainable aviation fuel (SAF) into their kerosene from 2025; this percentage will increase to 85% by 2050. Microalgae biofuel development is thus a welcome alternative with enormous promise.

Pioneering the Way Forward

Previously, microalgae biofuel was only produced as a supplement in Malaysia. Today, however, thanks to significant advancements in modern technology and the research and development of this form of biofuel, it has become more commonly used for energy or fuel, and could be a valuable resource to ensure domestic energy security.

Advancements in genetic engineering, for one, have opened more doors for this tiny organism. CRISPR-Cas 9 is a DNA editing technique that enables scientists to programme and regulate related metabolic pathways in the microalgae to increase biomass or oil production.



Now, we can enhance and improve on the microalgae's cells. Besides increasing productivity, we can shorten the cultivation period by genetically altering any type of microalgae strain using CRISPR-Cas 9, while taking advantage of the country's diverse range of microalgae to produce even more of it!



"Now, we can enhance and improve on the microalgae's cells. Besides increasing productivity, we can shorten the cultivation period by genetically altering any type of microalgae strain using CRISPR-Cas 9, while taking advantage of the country's diverse range of microalgae to produce even more of it!" enthused Dr. Zool.

While before this, researchers lacked the knowledge about where to cultivate the microalgae, as they grow in diverse environments including wastewater, fresh water and even sea water, CRISPR-Cas9 has also allowed the microalgae to be cultivated in controlled environments such as a pool.

In Malaysia, a meta-genome dataset was created to facilitate the creation of any type of microalgae strain. Presently, SIRIM has a genome data bank of about five strains, which are local and rare.

"In my laboratory, we are currently focusing on fresh water and sea water environments, and we have presented a prototype from sea water," shared Dr. Zool.

Microalgae biofuel production is a multistep process. There are four critical measures to be taken. The first step is to cultivate. The microalgae needs to be grown in an open environment outdoors.

"Microalgae need nutrients, lights and carbon dioxide to produce the oil. You will also have to make sure that there is no contamination or other microbes present that can destroy the microalgae," explained Dr. Zool.



Microalgae need nutrients, lights and carbon dioxide to produce the oil. You will also have to make sure that there is no contamination or other microbes present that can destroy the microalgae.



Did You Know?

Microalgae as a biofuel has numerous advantages over other alternate biofuel sources

Among others, it

- possesses high lipid content, making it suitable for biofuel production
- yields more biofuel per acre compared to other plant-based biofuels
- has a lower carbon emission profile
- helps to reduce dependency on fossil fuels



CRISPR-Cas 9

is a unique technology that allows for genome editing by removing, inserting or modifying DNA segments.



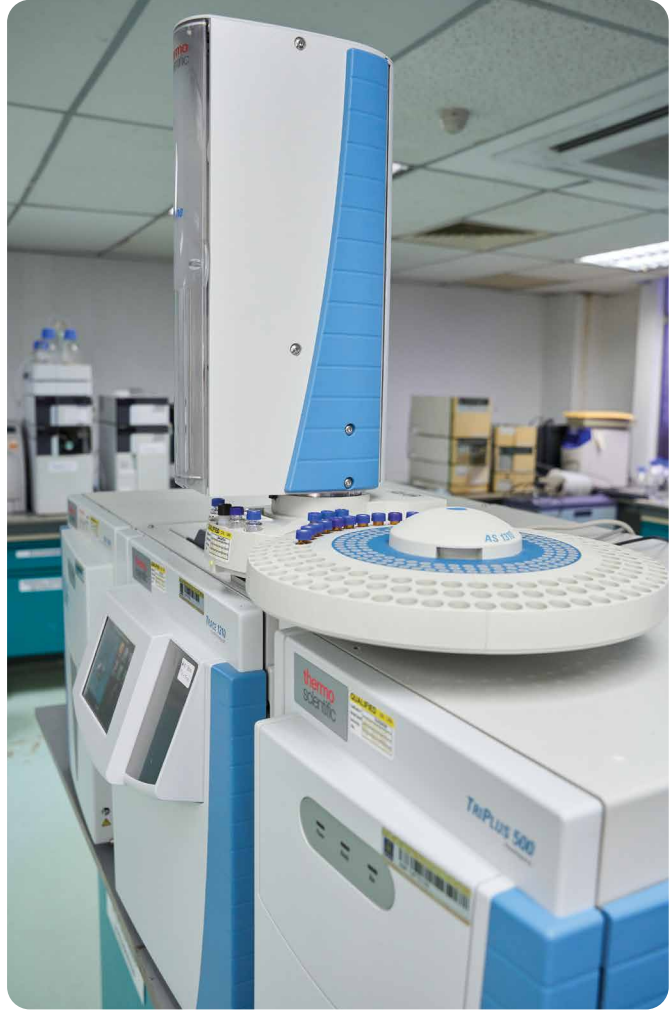
The second step involves harvesting the biomass generated in the tank or cultivation pond, while the third step is to extract the lipid from the cells. Finally, the fourth step is to convert the extracted oil into another type of fuel, such as biodiesel or biogas.

With the proper infrastructure, facilities and instruments available, SIRIM is set to facilitate the quality control of the oil produced by the microalgae. Besides that, SIRIM also looks forward to improving the oil extraction process.

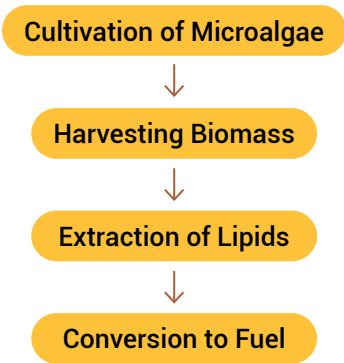
"We began developing the technology in 2021 and are currently in the research and development stage. Next will be genome editing as we have the strains and genome data," said Dr. Zool.

The current plan is to improve on SIRIM's research and development capabilities over the next three to five years before embarking on the pre-commercialisation stage. Dr. Zool also looks forward to forging partnerships with various stakeholders in the public or private sector to continue advancing microalgae technology. To improve the extraction process, in particular, he hopes to work with those with expertise in microbiology, bioreactor technology, and organic chemistry.

"This is a technological frontier, which we must embrace quickly. We don't want Malaysia to fall behind in this race. We must raise and strengthen our standing in research and product development so that we can emerge at the forefront," he said.



Producing Biofuel from Microalgae



This is a technological frontier, which we must embrace quickly. We don't want Malaysia to fall behind in this race. We must raise and strengthen our standing in research and product development so that we can emerge at the forefront.



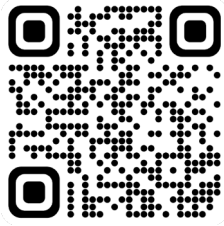
To find out more about microalgae biofuel and its potential as an alternative energy resource, kindly contact:

Industrial Biotechnology Research Centre

+603 5544 6960

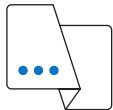
enquiryibrc@sirim.my

sirim.my/sirimir



The rise in the popularity of renewable energy is a step in the right direction. To ensure that this growth is sustainable, the development of proper energy storage solutions is essential.

Advancing Energy Storage Solutions



Dr. Abdul Hakim Hashim
 Director of the Industrial Centre of Innovation (IC-I) of Advanced Energy Storage, SIRIM Industrial Research



This is where energy storage comes in. Energy storage systems help bridge the gap between energy generation and demand, addressing the intermittent nature of renewable energy sources such as solar and wind power to ensure a reliable and continuous supply of clean energy.



The world has made significant progress in adopting and expanding the use of sustainable energy sources over the past decade. Reduced costs, improved technology, and encouraging regulations have led to a major increase in the capacity for the production of renewable energy, and the International Renewable Energy Agency (IRENA) projected that over one-third of the world's total power capacity, or 2,799 gigawatts (GW), would come from renewable sources by 2020. In nudging Malaysia down the path of energy sustainability, energy storage plays a crucial role in ensuring the success of this journey.

While renewable energy sources such as solar and wind power offer clean and abundant energy, their availability is dependent on factors like weather conditions and time of day, which can lead to fluctuations in energy production.

"This is where energy storage comes in. Energy storage systems help bridge the gap between energy generation and demand, addressing the intermittent nature of renewable energy sources such as solar and wind power to ensure a reliable and continuous supply of clean energy," said Dr. Abdul Hakim Hashim, Director of the Industrial Centre of Innovation (IC-I) of Advanced Energy Storage at SIRIM Industrial Research.

According to him, energy storage will allow for the efficient capture and storage of excess energy generated during high production times, such as sunny or windy conditions. This can then be released when demand is high or production is low. As such, energy storage systems enable more stable and reliable power supply.

Encouraging Sustainability

The widespread implementation of energy storage technologies will contribute to a more sustainable and resilient energy future. "Energy storage facilitates the adoption of renewable energy, consequently encouraging a reduced reliance on fossil fuels while mitigating greenhouse gas emissions, and promoting energy security and independence," said Dr. Abdul Hakim.

Specifically in Malaysia, energy storage can support the country's progression in sustainable energy through three main ways.

Malaysia has a high renewable energy potential, particularly solar energy. In addition to ensuring stable and consistent power supply, energy storage systems also have the potential to deliver reliable and affordable electricity to remote places in the country, where it could be difficult and expensive to extend traditional power grid infrastructure, thus boosting energy access and supporting socioeconomic growth.



Supporting Sustainable Energy

Enhancing Renewable Energy Integration

Enabling Energy Access in Remote Areas

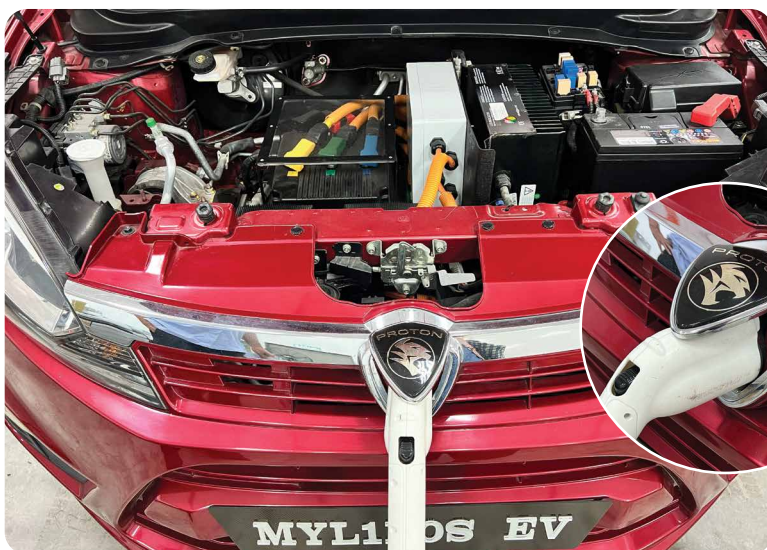
Supporting Electric Vehicle (EV) Adoption



Energy storage facilitates the adoption of renewable energy, consequently encouraging a reduced reliance on fossil fuels while mitigating greenhouse gas emissions, and promoting energy security and independence.



"Furthermore, as Malaysia aims to promote electric vehicle (EV) adoption, establishing a robust infrastructure supported by energy storage systems becomes critical," said Dr. Abdul Hakim. According to him, these devices can store extra renewable energy for EV charging, reducing grid pressure and ensuring efficient charging.



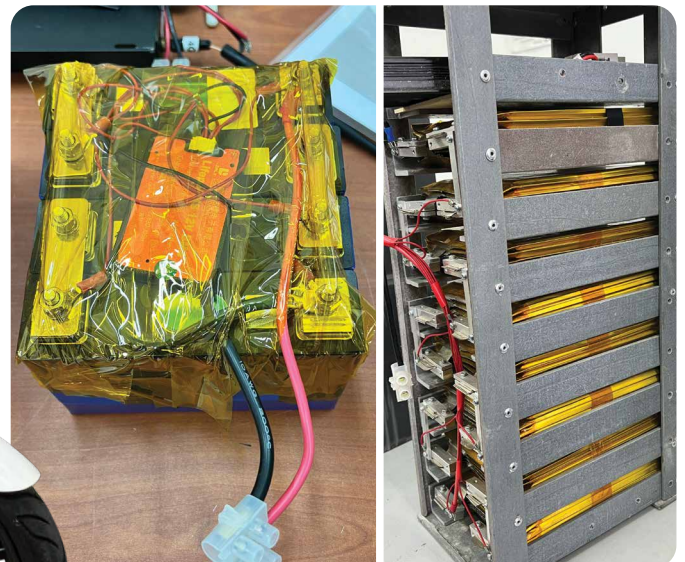
Furthermore, as Malaysia aims to promote electric vehicle (EV) adoption, establishing a robust infrastructure supported by energy storage systems becomes critical.



The involvement of SIRIM Industrial Research in energy storage-related activities is not new. It has been working on energy storage-related activities since 1998, beginning with fundamental research and development in the synthesis of battery materials. In 2016, SIRIM began to explore the battery's applications, such as solar street lights, motorcycles and EVs.

"The IC-I in Advanced Energy Storage is currently placing greater emphasis on batteries in EVs and battery energy storage systems in industrial applications. One of our main goals is to produce batteries with high capacity, high power and low cost. So far, our Lithium Iron Phosphate-based MyLipos battery has been used in various applications, including our EV prototype, e-bike and solar street light," he added.

The IC-I in Advanced Energy Storage is currently placing greater emphasis on batteries in EVs and battery energy storage systems in industrial applications. One of our main goals is to produce batteries with high capacity, high power and low cost. So far, our Lithium Iron Phosphate-based MyLipos battery has been used in various applications, including our EV prototype, e-bike and solar street light.



Potential Sustainable Energy Source

Dr. Abdul Hakim is also excited about the development of sodium-ion batteries, which has the potential to contribute to the sustainable energy movement, especially compared to lithium-ion batteries, due to several factors. These include:

- **Abundance of sodium** in comparison to lithium, which can help overcome the supply issues associated with lithium-ion batteries, while encouraging widespread deployment of energy storage systems
- **Increased cost-efficiency** due to the lower cost of sodium, which can increase affordability and accessibility and, in turn, the adoption rate
- **Reduced environmental impact** as sodium is more widely distributed in Earth's crust

However, he pointed out that sodium-ion batteries are still in their early phases of development, with technical issues such as enhancing energy density, lifecycle and safety that need to be addressed.

"Further research and development efforts are required to optimise sodium-ion battery technologies. I believe those challenges can be overcome, and sodium-ion batteries will be as important as lithium-ion batteries, particularly in stationary storage applications," he added.

In order to keep up with the latest technological advancements, additional research and development efforts to improve energy storage technologies are required. Materials, manufacturing methods and system design innovations can help overcome technological restrictions.

There will undoubtedly be difficulties in transitioning to energy storage systems, with factors such as costs, technical know-how and regulations playing an important role. Nevertheless, Dr. Abdul Hakim is optimistic that these can be overcome.

“Costs have been decreasing over time, and I believe that continued technical developments, economies of scale and supporting regulations can drive prices down further,” he remarked.

Additionally, addressing grid stability issues necessitates careful planning and collaboration. Grid codes and regulations may need to be revised to accommodate energy storage integration. “In order to keep up with the latest technological advancements, additional research and development efforts to improve energy storage technologies are required. Materials, manufacturing methods and system design innovations can help overcome technological restrictions,” Dr. Abdul Hakim explained.

Finally, policies that encourage grid flexibility, streamline regulatory processes and offer financial incentives might hasten the deployment of energy storage systems.

In the short term, SIRIM aims to integrate energy storage into renewable energy generation via a battery energy storage system (BESS), which will be used as Peak Demand Management tools in industries to save between 10% and 30% on electricity bills.



In addition to assisting industries through consulting, performance and safety testing of their goods, SIRIM also looks forward to developing a sodium ion battery and demonstrating the capability of a solid-state hydrogen storage system in mobile and stationary applications.

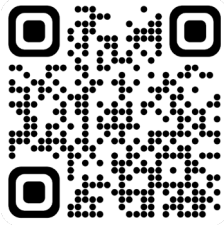
“Meanwhile, as a long-term goal, we envision the concept of self-generating and self-consuming, in which energy is generated on-site and consumed locally rather than exported to the grid. To realise this, further research needs to be done to increase the efficiency and performance of renewable energy generation and storage capabilities, so that they will become technologically and economically viable,” enthused Dr. Abdul Hakim.

Meanwhile, as a long-term goal, we envision the concept of self-generating and self-consuming, in which energy is generated on-site and consumed locally rather than exported to the grid. To realise this, further research needs to be done to increase the efficiency and performance of renewable energy generation and storage capabilities, so that they will become technologically and economically viable.



To find out more about energy storage systems or SIRIM's other capabilities and offerings related to energy storage, kindly contact:

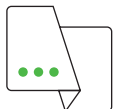
Dr. Abdul Hakim Hashim
 +6019 572 5803
 hakim@sirim.my
 sirim.my/ic innovation



Smart and Intelligent

Packaging has emerged as a high-tech solution in the packaging industry, incorporating smart materials and elements such as quick response (QR) codes, radio frequency identification (RFID), freshness indicators and time-temperature indicators. The advancement of Industry 4.0 technologies has paved the way for the widespread adoption of this innovative packaging approach.

Future-proofing Local Businesses



Abdul Halim Yacob
Head of the Packaging Design Section of SIRIM's Packaging and Security Design Centre (PSDC)



The usage of QR codes is vast, as it also includes virtual reality (VR) and augmented reality (AR) that enable consumer communication with the product. These provide instant access to product details, promotions and even personalised messages with a simple smartphone scan. Both QR codes and RFID tags allow consumers to access additional product information, such as nutritional facts, ingredients and interactive experiences, creating a more engaging and informative shopping experience while making well-informed purchasing decisions.



In a world driven by technology, packaging has evolved to encompass smart and intelligent solutions that offer enhanced product quality and interactive features. Smart and intelligent packaging can be broadly categorised into two components: active and intelligent packaging.

Active packaging focuses on preserving and enhancing product quality. It employs various technologies and materials to interact actively with the product and environment. One notable example is the utilisation of chemical sensors that can detect and respond to specific changes in the product, such as oxygen or pH levels. This enables real-time monitoring and control, ensuring optimal product integrity and freshness.

Intelligent packaging, on the other hand, takes active packaging to the next level by incorporating various elements, including microchips, quick response (QR) codes and radio frequency identification (RFID) technology. These elements enable communication and information retrieval, empowering producers and consumers with valuable insights. Microchips embedded in packaging can store and transmit data, providing detailed information about the product's origin, manufacturing process, expiration date and more.

"The usage of QR codes is vast, as it also includes virtual reality (VR) and augmented reality (AR) that enable consumer communication with the product. These provide instant access to product details, promotions and even personalised messages with a simple smartphone scan. Both QR codes and RFID tags allow consumers to access additional product information, such as nutritional facts, ingredients and interactive experiences, creating a more engaging and informative shopping experience while making well-informed purchasing decisions," shared Abdul Halim Yacob, Head of the Packaging Design Section of SIRIM's Packaging and Security Design Centre (PSDC).



Smart & Intelligent Goals

PSDC is undertaking an Innovation Development Project on Smart and Intelligent Packaging for Malaysian Products under the 12th Malaysia Plan. Among others, the project aims to:

- Create and develop competitive smart and intelligent packaging innovations for Malaysian products with advanced and quality technology
- Apply and encourage Industry 4.0 packaging technology in Malaysia
- Empower products in various sectors, including food & beverage, cosmetics & personal care, pharmaceuticals, automotive, electronics and telecommunications in the country
- Address issues such as counterfeiting, brand protection, inventory and lifecycle management issues, product integrity and user experience

Towards Better Sustainability

Smart and intelligent packaging offers a host of advantages, such as improved product quality, longer shelf life and increased consumer engagement. These can encourage sustainability by reducing waste, utilising eco-friendly materials and driving energy savings and carbon emissions reduction across production and supply chains. An example is PSDC's Plant Growth Regulator (PGR) sachets and cards that combine the technology of regulating ethylene and active anti-fungal ingredients into paper-based packaging for a variety of perishable products.

"The technology illustrates the potential of a circular economy, whereby organic waste from fruits and vegetables are collected, treated and processed for this purpose. PGR sachets are available in a convenient powder form, specifically engineered to regulate ethylene and moisture levels within the packaging, thereby making them highly versatile for use for edible items. On the other hand, the card utilises slow-releasing bioactive ingredients injected into recyclable paper. This innovative design effectively deters bacterial and fungal growth within the packaging, and eliminates unpleasant odours in dried food. To achieve comparable functionality on various surfaces, we deploy an antioxidant and antifungal spray (SAKAO) in liquid form," elaborated Abdul Halim.

Composed of bioactive ingredients, the SAKAO is used to coat cardboard boxes and paper packaging. All three options efficiently absorb surplus moisture, maintaining the product's freshness and extending its shelf life.

In addition to moisture absorption and temperature regulation, PSDC has also explored the use of invisible ink for brand protection. By incorporating invisible ink into packaging designs, manufacturers can create a unique and secure identification mark, which can only be detected through ultraviolet scanners. This feature provides an additional layer of protection against counterfeit products and helps maintain the brand's integrity.

Abdul Halim proceeded to cite some examples. "The companies may adopt multiple smart and intelligent packaging solutions to fulfil their organisational objectives. For instance, Halagel Plant (M) Sdn Bhd leverages a Track and Trace System in Packaging and Delivery (TePaD) by employing infrared sensors and artificial intelligence (AI) technology. This optimises the company's logistics and sales processes. On the other hand, Al Haddad Manufacturing Sdn Bhd tackles the issue of counterfeiting while ensuring product freshness by utilising both invisible ink and PGR sachets."

Collaborations with companies distributing and exporting figs and Harumanis mangoes have also yielded remarkable success. Through the implementation of PGR sachets, the shelf life of these fruits can be extended, reducing waste and allowing for access to distant markets. The freshness of dry products like cookies and kuih bahulu can also be prolonged for over two months with PGR technology.

Furthermore, the intelligent packaging data collected offer valuable consumer preferences insights to support market research and product development. Manufacturers can refine their offerings to meet the demands of consumers better.





By embracing intelligent packaging solutions, Malaysian manufacturers gain a competitive edge. The improved traceability and data insights contribute to maintaining product integrity and satisfying customers. These foster transparency and fair business practices. Besides that, scientific evidence demonstrates a remarkable 50% increase in freshness, enabling further geographic distance export.



“By embracing intelligent packaging solutions, Malaysian manufacturers gain a competitive edge. The improved traceability and data insights contribute to maintaining product integrity and satisfying customers. These foster transparency and fair business practices. Besides that, scientific evidence demonstrates a remarkable 50% increase in freshness, enabling further geographic distance export,” elaborated Abdul Halim.

For consumers, smart packaging offers convenience, transparency and product authentication. Security features like QR codes and RFID tags enable authentication and safeguard against counterfeit goods. Comprehensive product information empowers consumers to make informed choices based on their preferences, dietary needs and ethical considerations. Real-time updates provide reassurance regarding safety and quality.

The industry is also introducing sustainable printing methods and recyclable materials, embracing an environmentally conscious approach. These initiatives contribute to reducing energy consumption and carbon emissions throughout the packaging lifecycle, thus mitigating the industry’s environmental impact.

Empowering Smart and Intelligent Packaging

To encourage the adoption of smart and intelligent packaging among manufacturers, PSDC recently introduced a Smart and Intelligent Packaging Platform (SIPP) to support its initiatives. SIPP is a digital packaging platform that gathers related packaging information in a centralised digital environment. It connects the digital and physical world through design, security and traceability. More importantly, it offers new different user experiences as all the product insights are at the customers’ fingertips. The primary goal of SIPP is to optimise the traceability, authenticity and user experience in the packaging and delivery processes to ensure product compliance and safety, as well as enabling users’ accessibility to the product. By integrating advanced technology and streamlined workflows, SIPP simplifies various aspects of the packaging business.

One of the key benefits of SIPP is that it enhances operational efficiency and creates seamless customer experiences. The platform provides a user-friendly interface, allowing customers to place orders, track shipments and manage returns easily. Furthermore, it elevates customer experience to the next level as it encourages deeper customer interaction with the physical product and digital brand presence. This simplification and enhancement of processes reduces the time and effort required for both customers and packaging companies, improving productivity and customer satisfaction,” said Abdul Halim.



Immense Advantages

For Producers

- Lower production cost
- Improved product quality
- Extended shelf life
- Waste reduction
- Optimised supply chains
- Traceability of supply chain
- Consumer data & engagement
- Brand retention & loyalty
- Expansion of market reach

For Consumers

- Trust & transparency, making it easier to make purchasing decisions based on information such as product branding, individual preferences, dietary content and ethical considerations
- Convenience
- Alignment with sustainable and eco-friendly lifestyles
- Higher product quality
- Real-time updates on temperature and expiration status



Transparency in transactions is another important aspect of SIPP. By leveraging digital tools and real-time data, the platform ensures that pricing is transparent and consistent across all transactions. It detects irregularities or deviations from predetermined prices, preventing unscrupulous dealings and promoting fair and ethical business practices.

SIPP also focuses on other crucial factors in the packaging industry, such as traceability, agility, sustainability, authenticity, security, quality and safety. The platform incorporates features that enable tracking and tracing of packaging materials throughout the supply chain, ensuring that customers have visibility into the origin and movement of their products. Additionally, it emphasises sustainability by promoting eco-friendly packaging materials and efficient logistics practices.

Driving Market Penetration for Business Growth

The advancement of smart and intelligent packaging is anticipated to promote improved energy sustainability. This involves extensive research and development, fostering collaboration within the industry, promoting sustainable printing practices and encouraging the adoption of eco-friendly packaging materials. With a focus on continuous improvement, PSDC aims to contribute to a greener and more sustainable future as well as helping Malaysian companies and their products to reinforce their competitiveness in both local and global markets.

As such, various marketing and promotional activities were planned for 2023. These include exhibitions and webinars that aim to engage potential customers with success stories and real-life data on the effectiveness of PSDC's smart and intelligent packaging initiatives. To date, its efforts have attracted approximately 200 participants. The ultimate goal is to offer services that address industry challenges within a five-year time frame, specifically targeting counterfeiting issues.

"As the current year aligns with the 12th Malaysia Plan, business connectivity will be fostered through the collaboration of available agencies. As part of this initiative, promotional materials will be disseminated at exhibitions, and select industries will be provided with complimentary PGR sachets," stated Abdul Halim.


According to him, "The determining factors for companies to receive the complimentary PGR products include a keenness to collaborate with SIRIM, taking into account criteria such as their willingness to cooperate, product output volume and company size."

As technology continues to advance, smart and intelligent packaging will undoubtedly shape the future of packaging, creating a more interactive, sustainable and consumer-centric industry.




Industries embracing smart and intelligent packaging solutions include:

- Food & Beverage
- Cosmetics
- Pharmaceuticals
- Automotive
- Electrical
- Telecommunications



The determining factors for companies to receive the complimentary PGR products include a keenness to collaborate with SIRIM, taking into account criteria such as their willingness to cooperate, product output volume and company size.



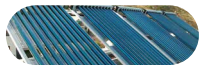

To find out more about smart and intelligent packaging, kindly contact:

Abdul Halim Yacob

+6012 353 1136

abdhalim@sirim.my

www.facebook.com/sirimpackaging



With the world shifting towards a greener way of life, solar water heating has been gaining traction. Amidst the proliferation of this technology, SIRIM STS Sdn Bhd has unveiled a set of standards geared at paving the way for users looking to head down the path of sustainable energy usage.

Warming up to Solar Water Heating



Salmah Mohd Nordin
Head of Standards Development
Section, SIRIM STS Sdn Bhd (SIRIM STS)



Solar water heating systems are suitable for various applications such as domestic hot water heating, space heating and swimming pool heating, as well as the generation of process heat for commercial and industrial purposes. For the latter, some of the uses include in hospitals, hotels, guesthouses, laundries, apartments, office buildings, dairy farms, indoor swimming pools and the food manufacturing industry.

Malaysia is blessed with year-round sunny weather, providing perfect conditions for an abundance of solar energy supply. One of the solar technologies currently taking flight is solar water heating systems, whether for domestic or larger-scale use.

“Solar water heating systems are suitable for various applications such as domestic hot water heating, space heating and swimming pool heating, as well as the generation of process heat for commercial and industrial purposes. For the latter, some of the uses include in hospitals, hotels, guesthouses, laundries, apartments, office buildings, dairy farms, indoor swimming pools and the food manufacturing industry,” explained Salmah Mohd Nordin, Head of Standards Development Section at SIRIM STS Sdn Bhd (SIRIM STS).

An escalating demand for solar water heating systems necessitates the development of comprehensive standards to guide the progress and potential expansion of solar energy usage. To this end, SIRIM STS has stepped up to introduce a series of solar water heating systems standards. These are:

- **SWH 01-2021:** Solar water heating systems-Design specification
- **SWH 02-2021:** Solar water heating systems-Installation guide
- **SWH 03-2021:** Solar water heating systems-Testing and commissioning
- **SWH 04-2021:** Solar water heating systems-Operation and maintenance

Solar water heating systems that are commonly available in the market comprise factory-made or custom-built systems. According to Salmah, “Factory-made systems are batch products that are generally marketed under one trade name and sold as complete and ready-to-install kits with fixed configurations. These are considered to be





a single product and assessed as a whole. In comparison, custom-built solar heating systems are either uniquely designed and built or assembled using various components. Systems in this category are regarded as a set of components. As such, the components are separately tested, and test results are then integrated into an assessment of the whole system."

Among others, the series of solar water heating system standards was designed and developed to produce comprehensive documents detailing current technical requirements, provide guidance on the best practices in the design of solar water heating systems, and educate and create awareness among stakeholders on the importance of the best practices for these systems. This will help to improve the efficiency of the entire product lifecycle – from the design, development and manufacturing to the installation, operations and maintenance. "On the flip side of the coin, the development of these standards also provide assurance to consumers on the safety, reliability and efficiency of the solar water heating systems in the marketplace," continued Salmah.

On the flip side of the coin, the development of these standards also provide assurance to consumers on the safety, reliability and efficiency of the solar water heating systems in the marketplace.



Essentials for Excellence

Each of the standards by SIRIM STS for solar water heating systems addresses various aspects.

- **SWH 01-2021: Solar water heating systems-Design specification**

This standard provides the requirements for the design and testing of the solar water heating system and its components, as well as the calculation of heat loss and the sizing of the system

- **SWH 02-2021: Solar water heating systems-Installation guide**

This standard prescribes the guidelines for the installation of solar water heating systems as well as requirements for marking

- **SWH 03-2021: Solar water heating systems-Testing and commissioning**

This standard specifies procedures for testing and commissioning of the installation of solar water heating systems

- **SWH 04-2021: Solar water heating systems-Operation and maintenance**

This standard depicts the procedures for the operations and maintenance of solar water heating



A Collaborative Effort

The standards were developed in collaboration with the United Nations Industrial Development Organization (UNIDO) through the project GHG Emissions Reduction in Targeted Industrial Sub-Sectors through Energy Efficiency (EE) and Application of Solar Thermal Systems in Malaysia, which was financed by the Global Environment Facility (GEF).

"The main goal of the standards was to essentially provide specifications and guidelines for the design of safe and workable solar water heating projects in Malaysia. This is in line with UNIDO's mandate, which is fully recognised in the ninth Sustainable Development Goal (SDG) to 'build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation'," added Salmah.

Besides experts from UNIDO, other stakeholders involved in the development of the solar water heating system standards were Suruhanjaya Tenaga, Sustainable Energy Development Authority Malaysia (SEDA Malaysia), Solar Energy Research Institute of Universiti Kebangsaan Malaysia (UKM SERI), Faculty of Mechanical and Automotive Engineering Technology from Universiti Malaysia Pahang (UMP), Cawangan Kejuruteraan Mekanikal Jabatan Kerja Raya (JKR), Kementerian Kesihatan Malaysia, Solar District Cooling, SIRIM Berhad, Universiti Teknologi Malaysia, Universiti Teknologi MARA, Universiti Tenaga Nasional and Zamatel Sdn Bhd.

"We've done the legwork and come up with comprehensive guidelines for solar water heating systems. As the standards help to ensure the safety, durability and performance of the systems, all parties – from manufacturers to consumers – will benefit from them. As such, I urge manufacturers and suppliers in particular to take advantage of these standards to give your brand a competitive edge in the marketplace," said Salmah.

Standards for other systems not covered under the series of solar water heating system standards by SIRIM STS may be available in different publications, such as the MS 1367, which provides specifications for domestic solar water heaters. These industry standards on solar water heating systems were developed to provide standardised information on the requirements, specifications or guidelines to be used by system designers, installers and building owners when dealing with custom-built solar water heating systems.



To find out more about the series of standards for solar water heating systems or any other standards, kindly contact:

Salmah Mohd Nordin

+603 5544 6909

salmah@sirim.my

sirimsts.my

Myriad Benefits

The series of solar water heating system standards will encourage best practices in solar water heating systems and bring about sustainable benefits to all stakeholders.

For Manufacturers



Proper benchmarking



More efficient operations

For Consumers



Energy cost savings



Increase in property value

For the Environment



Reduced greenhouse gas emissions & carbon footprint



We've done the legwork and come up with comprehensive guidelines for solar water heating systems. As the standards help to ensure the safety, durability and performance of the systems, all parties – from manufacturers to consumers – will benefit from them. As such, I urge manufacturers and suppliers in particular to take advantage of these standards to give your brand a competitive edge in the marketplace.





ADVERTISEMENT RATES (RM)

Full Colour	Insertions			
	1	2	3	4
ROP	3,500	3,000	2,500	2,000
Back Cover (A4)	5,000	4,500	4,000	3,500
Inside Front Cover (A4)	4,500	4,000	3,500	3,000
Inside Back Cover (A4)	4,000	3,500	3,000	2,500
Specified Positions (A4)	4,000	3,500	3,000	2,500
Half Page Specified Positions	3,000	2,500	2,000	1,500
Half Page Specified ROP	2,500	2,000	1,500	1,000

ADVERTISEMENT BOOKING FORM

PARTICULARS

Company:

Address:

.....

Tel: Fax:

E-mail: Contact Person:

Job Title:

BOOKING DETAILS

Frequency 1x 2x 3x 4x

Position ROP Back Cover Inside Front Cover Inside Back Cover Specified Positions

Payment must be made by crossed cheque or money order, and payable to SIRIM Berhad. Further enquiries, please call Nurazlina Ismail (Corporate Affairs: 03-5544 6772).

SIRIM Standards Store



Find Us. Find Standards.

SIRIM STANDARDS
MALAYSIAN ACTS AND REGULATIONS
ISO JIS ASTM BS
CARBON FOOTPRINT
SIRIM ECO AIAG IEC



For more information:

Tel: 603 5544 6111/6112/6142

Email: standards@sirim.my

Link: <https://standards.sirimsts.my>

SIRIM Technical Library

We provide the best Library Membership Scheme to assist industry, government agencies, association and academician get access to standards, technical reports, journals and other scientific and technical publications. Enjoy the privileges of SIRIM Technical Library membership scheme.

Privileges that We Offer:

Business Consulting



Service & Advice



Marketing & Research



◆ Unlimited Reference

Vast collection of Malaysian Standards, International, Foreign and Association Standards for your references

◆ Library Collection

You can borrow up to 15 materials at a time with a maximum of 14 days borrowing period

◆ Standards Update Services

We provide you with reports on standards updates, amendments and withdrawals of standards

**Sign up now as
our members
and enjoy the
privileges!**



**For
more information:**

Tel : 03 5544 6102/6108/6100

Fax : 03 5544 6119

Email: library@sirim.my

Link: <https://elibrary.sirim.my>