Towards a World-Class Energy Sector

Suruhanjaya Tenaga
Energy Commission

ENERGY MALAYSIA

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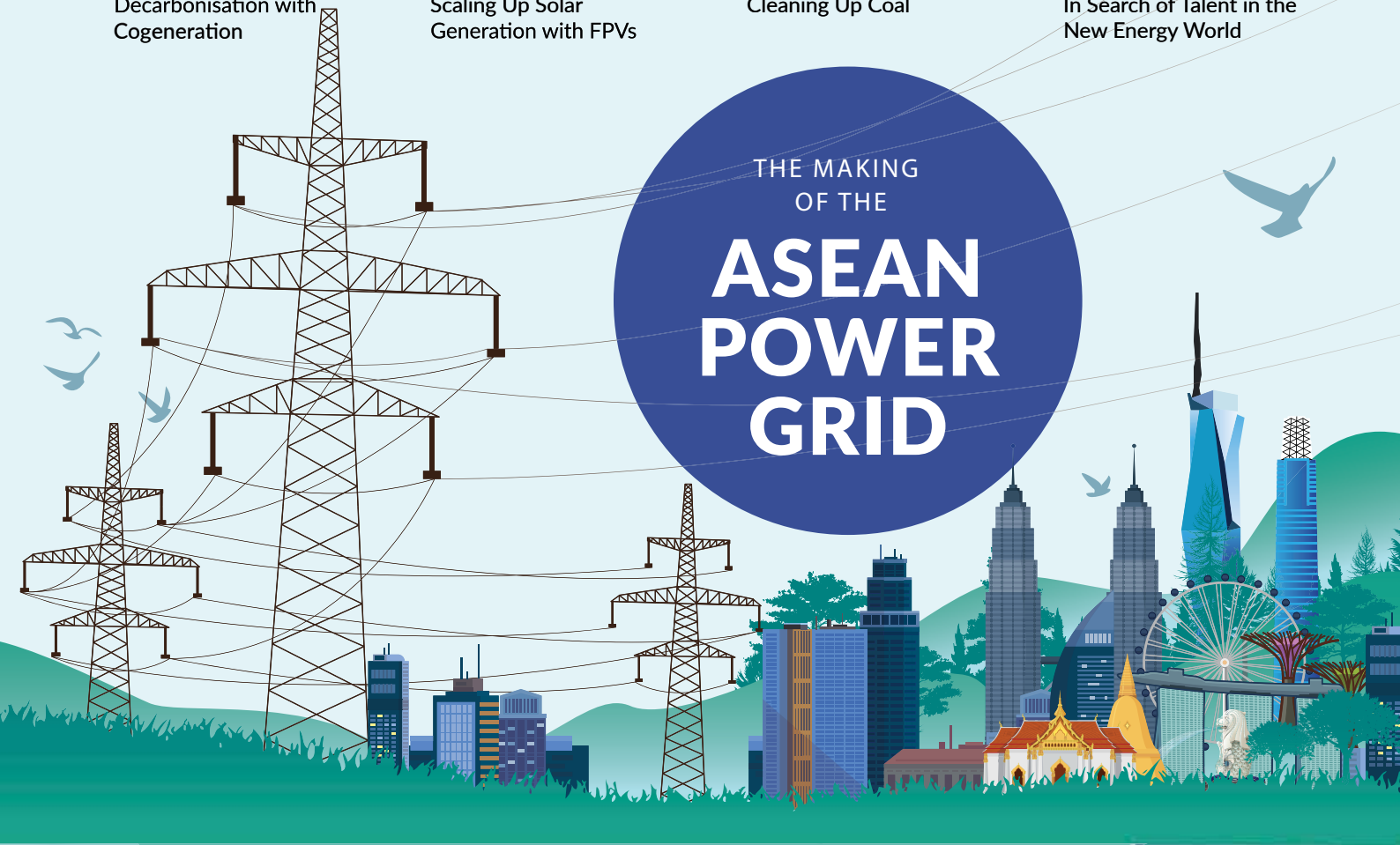
Decarbonisation with Cogeneration

INNOVATION
Scaling Up Solar Generation with FPVs

BEYOND BORDERS
Cleaning Up Coal

EDUCATION
In Search of Talent in the New Energy World



THE MAKING OF THE ASEAN POWER GRID

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Be Energy smart

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SOME PATHWAYS TO DECARBONISATION

Dato' Ir. Ts. Abdul Razib Dawood
Chief Executive Officer

Malaysia is proud to be a pioneer in the implementation of the ASEAN Power Grid, which kicked off in 2018 with the first multilateral power transfer from Lao PDR to Malaysia via Thailand, as our cover story "The Making of the ASEAN Power Grid" tells us.

As nations race towards carbon neutrality by 2050, balancing energy security, sustainability and affordability needs serious answers. More so since megatrends predict sharp increases in population and the electrification of transportation and cities as part of the ongoing energy transition. This will intensify demand for power on one hand, and on the other hand, there is the need to cut back on emissions as per our Paris Agreement pledges. The spotlight is on the energy industry, well documented as the world's No. 1 carbon emitter.

Against this scenario, power trading has gained traction, with electricity becoming a commodity to be bought and sold between nations. The European Union (EU) has moved ahead in this direction, and regional blocs including ASEAN are catching up. Our cover story delves into the power trading in the region.

ASEAN's first commercial power transaction involved the sale of electricity by Lao PDR to Malaysia using existing interconnections. Previously, power transfers were Government-to-Government arrangements for emergencies only. There were no monetary exchanges. Only goodwill. Singapore joined the commercial network in 2022, and with it, the Lao PDR-Thailand-Malaysia-Singapore leg of the ASEAN grid became operational.

The transactions thus far highlight sustainability (hydropower purchases) and security (gas power purchases). For Lao PDR, the power sale is export revenue.

Our cover story also looks at the progress of the ASEAN Power Grid elsewhere in the region, such as the Trans Borneo Grid and the Brunei, Indonesia, Malaysia and Philippines East ASEAN Growth Area (BIMP EAGA). We present the progress, opportunities and challenges there.

We are also making headway in terms of energy efficiency. Our Special Focus article on "Decarbonisation with Cogeneration" looks at how energy guzzlers like power plants and industrial facilities can convert their waste heat into electricity and thermal heating. The article enlightens our readers on how cogeneration can lower operational costs, boost self-sufficiency and reduce emissions.

Our Innovation segment builds the case for floating solar panels in the article entitled "Scaling Up Solar Generation with FPVs", regarded as one of the fastest growing power generation technologies today. The article cites several FPVs in Malaysia that are operational or under development, including a few with capacities that will make them among the largest in the world.

"Malaysia is proud to be a pioneer in the implementation of the ASEAN Power Grid, which kicked off in 2018 with the first multilateral power transfer from Lao PDR to Malaysia via Thailand."

Small and Medium Enterprises (SMEs) and Micro-SMEs (MSMEs) are trying to become energy efficient, but their efforts are stymied by financial obstacles. We invited Nizam Mohamed Nadzri, Chief Executive Officer of Malaysia Debt Ventures Berhad that specialises in such SME and MSME financing, to walk us through options available to them in Parting Shot's "The Funding Dilemma." Our columnist also highlights what more policymakers can do to help this segment of business operators make the switch.

The rush for renewables has turned up the heat for expertise in this area by several notches. For our Education segment, Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali sheds light on the "Search for Talent in the New Energy World", of how demand outstrips supply. Herein lies opportunities for students – in secondary schools, in universities – and for reskilling the redundant workforce. Our Then & Now segment talks of what is happening right there in our homes, which are being transformed with the "Switchover from Analogue to Digital Technologies", of how analogue devices and appliances are being supplanted by smart systems. Is this a matter of convenience, energy savings or to keep up with the Joneses? Why not all!

Happy reading!

NEWS FROM MALAYSIA AND AROUND THE WORLD

MALAYSIA

Government Extends ICPT Exemption for Green Energy Tariff

The Government has extended the exemption of Imbalance Cost Pass-Through (ICPT) charge on Green Electricity Tariff (GET) in the first half of 2023, and maintaining a surcharge of 3.7 sen/kWh for the GET during this period.

In the meantime, the Energy Commission, will be reviewing the ICPT exemption incentive for the second half of the 2023 period in order to ensure clarity and fairness of the mechanism, the Ministry of Natural Resources, Environment and Climate Change said in a statement. The review will take into account the security, reliability and sustainability of the electricity supply system holistically, the Ministry added.

With GET, carbon-conscious consumers without their own renewable energy installations can take up the grid's renewable energy quota in exchange for Malaysian Renewable Energy Certificate (mREC) to improve their score in the Environment, Social and Governance (ESG) aspect.

The Edge Markets, 12 January 2023

Selangor Studying Introduction of Hydrogen Buses

The State Government is conducting research to introduce hydrogen buses within five years or before 2030. State Executive Councillor for Environment Hee Loy Sian said hydrogen buses are environmentally friendly and do not emit fumes like diesel. They are also more powerful than electric buses.

"This plan is in line with the State Government's efforts to reduce carbon emissions by 45% in 2030 and zero carbon emissions by 2050," he said after officiating the Environment Day celebration at the Ampang Jaya Municipal Council (MPAJ), Menara MPAJ.

However, Hee said that the State Government is facing constraints in obtaining a large number of hydrogen resources unless it is imported. "Before implementing the use of hydrogen buses, hydrogen production must be available and we have not yet reached the stage of producing hydrogen on a large scale that can be used for vehicles.

"Foreign countries have started producing hydrogen. Sarawak is leading the way here, and wants to sell its hydrogen to Singapore. Consequently, we intend to work with foreign countries such as Korea to produce hydrogen and hydrogen buses," he said.

Selangor Journal, 7 February 2023

Malaysia to Install 10,000 EV Charging Points by 2025

Malaysia aims to install 10,000 electric vehicle (EV) charging points by 2025 through the Low Carbon Mobility Blueprint, said Natural Resources, Environment and Climate Change Minister Nik Nazmi Nik Ahmad. He said there were now more than 10,000 registered EVs in the country and 900 public EV chargers.

"The Ministry is also committed to increasing electricity generation from renewable energy sources through the Electricity Supply Generation Development Plan 2021-2039, while reinforcing the grid and developing the EV ecosystem," he said in his speech at Malaysia's EV Conference 2023.

He said the key challenge was to make EV practical and irresistible to all levels of society, but market forces alone might not be sufficient. Hence, he said there should be appropriate incentives for both consumers and producers to speed up the transition to or adoption of EVs.

Malay Mail, 14 February 2023

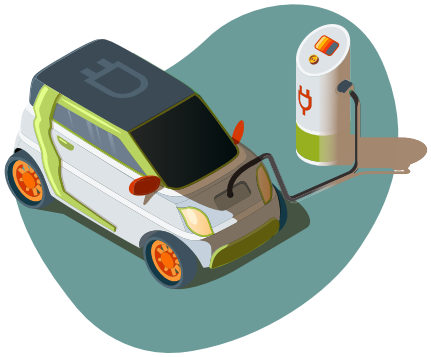
EECA Bill in Research Stage

The Ministry of Natural Resources, Environment and Climate Change is currently scrutinising the bill on efficient energy use and conservation. Its Minister Nik Nazmi Nik Ahmad said the bill, known as the Energy Efficiency and Conservation Act (EECA), was currently at the research stage and would be finalised before being brought to the Attorney-General's Chambers (AGC) and presented to the Cabinet.

"Many countries already have such an Act, and we want to see what are there in terms of energy efficiency and energy-using products. We have mentioned the Act before, we hope to finalise and bring it to the next stage," he said after the launch of the Malaysia Energy Literacy Programme (MELP).

The Act, among others, will strengthen the legal framework related to energy efficiency and conservation to ensure full involvement at various levels of institutions and organisations.

New Straits Times, 1 March 2023



Energy Literacy Can Help Make Sustainability Possible

Energy literacy – that's another form of literacy that the Government and utility providers want people to have. It means having a broad understanding of the characteristics and role of energy in daily lives, which has to go together with the ability to apply it to solve problems.

The Ministry of Natural Resources, Environment and Climate Change together with Tenaga Nasional Berhad (TNB) want to create a generation of Malaysians who can picture how energy flows, and to think through the sustainability of energy systems. Accordingly, Minister Nik Nazmi Nik Ahmad unveiled the Malaysia Energy Literacy Programme (MELP), a TNB-funded programme that has largely been running since the company started it in 2020.

According to TNB, the chief aim of MELP is to share information with Malaysians so that they understand the importance of energy. The Minister said MELP is a systematic push to promote sustainability at all levels of the energy supply ecosystem, from the utilities all the way to the end consumer, be it commercial or residential users.

The Star, 2 March 2023

Cryptocurrency Miners Caught Stealing Electricity

Despite enjoying the lowest electricity tariff in Malaysia and amongst the lowest in the region, cryptocurrency miners in Sarawak continue to engage in widespread electricity theft as they attempt to illegally reduce their operating costs. This behaviour is not limited to individual miners, but also extends to business entities.

In 2023 alone, a total of seven cryptocurrency miners were found stealing electricity, with four in Kuching and three in Miri. Sarawak Energy Berhad (SEB) estimates that it has incurred losses of more than RM87,000 per month from these cases.

In Miri, two shop lots at Senadin Commercial Centre were found mining cryptocurrency with stolen electricity. The discovery was made when the technical team from SEB received complaints of electricity supply interruptions at neighbouring shophouses.

SEB estimates that it has incurred losses of around RM32,000 worth of stolen electricity per month from these two sites alone. All servers, electronic equipment and direct tapping cables have been seized as evidence.

Police reports have been lodged and all involved parties will be called for further investigations. If found guilty, they will be charged under Section 33(5) of the Electricity Ordinance, with penalties of up to RM100,000 and / or five years in jail.

Sarawak Energy, 20 March 2023

Government in Midst of Formulating National Hydrogen Strategy

The Government is still in the process of developing a comprehensive roadmap and strategy for the hydrogen economy, according to Deputy Minister of International Trade and Industry (MITI) Liew Chin Tong.

Once the strategy is agreed upon and implemented, MITI will work with relevant stakeholders to find the right incentives and opportunities, such as tax incentives, capital allowances, financial support, and research and development, to attract investment in hydrogen production and infrastructure, he said.

Hydrogen has been identified as a fuel for the future in Malaysia's National Energy Policy. The Ministry of Science, Technology and Innovation, alongside the National Nanotechnology Centre, are currently drafting the National Hydrogen Strategy.

"As we know, the Government has committed to transitioning Malaysia to a carbon neutral nation by 2050. In addition, as part of the Paris Agreement, we have committed to reducing the intensity of greenhouse gas emissions by 45% in 2030, relative to 2005. Hydrogen is part of this transition," the Minister added.

The Edge Malaysia, 21 March 2023

Malaysia's National Grid Can Take on More Renewable Energy, Says IRENA Chief

Malaysia's national power grid has the capacity to take on more energy from renewable energy sources up until 2030 without affecting grid stability, said International Renewable Energy Agency (IRENA) Director-General Francesco La Camera.

"However, investment for the grid of the future must be committed now to ensure continuity through the energy transition," he said. "At the moment, Malaysia is not in a hurry but naturally the grid has to evolve to make it possible for even more renewable energy sources to come in," he told The Edge at the sidelines of the Malaysia Energy Transition Outlook launch.

Overall, Malaysia is expected to see installed generation capacity (excluding battery storage) of renewable energy to increase to up to 33% of total capacity by 2030, according to the IRENA Malaysia Energy Transition Outlook Report. The energy transition outlook report anticipates that USD4.8 billion in investments is required for the national transmission grid from now until 2030.

The Edge Malaysia, 26 March 2023

"At the moment, Malaysia is not in a hurry but naturally the grid has to evolve to make it possible for even more renewable energy sources to come in."

The Energy Commission to Make Power Programme More Accessible

The Energy Commission says it has capped the solar power plant export capacity at 30 MW under the Corporate Green Power Programme (CGPP) to expand the reach of the programme and make it more accessible to a greater number of businesses. This is despite having recently increased the programme's quota from 600 MW to 800 MW.

During an interactive dialogue of the CGPP guidelines, the Energy Commission's Chief Operating Officer Ir. Abdul Rahim Ibrahim said only new solar power plant projects with an export capacity from 5 MW to 30 MW are eligible to participate in the CGPP.

"We have a quota of up to 800 MW for CGPP, and hence we want to have as many solar power producer participation as we can," he said, when asked regarding the 30 MW cap.

CGPP is designed to promote collaboration between solar power producers and commercial power consumers to commission additional solar power generation capacity. This programme is based on virtual power purchase agreements, providing businesses with opportunities to participate in the promotion and use of renewable energy in their operations.

By encouraging these partnerships, the CGPP aims to drive the adoption of clean energy and contribute to the reduction of carbon emissions.

The Star, 19 April 2023

Malaysia to Lift Export Ban on Renewable Energy Exports

Malaysia will lift a ban on the export of renewable energy as part of efforts to develop its clean power industry and boost generation from non-fossil fuel sources, said its Minister of Economy, Rafizi Ramli. He also said reversing the ban will help firms build renewable power generation capacity on a larger scale and take advantage of high demand from neighbouring Singapore.

In October 2021, renewable energy exports were banned in the hope of developing the local industry.

Rafizi said the Government aims to increase the proportion of renewable energy supply to 70% of its total capacity by 2050 in a bid to create new economic opportunities and attract foreign investments. The current installed capacity is 25% of the total, he said.

The International Renewable Energy Agency (IRENA) said in March that Malaysia will need to double its investments in renewable power capacity, infrastructure and energy efficiency to at least USD375 billion in order to achieve that ambitious target.

Reuters, 9 May 2023

Task Force to Coordinate Electricity Supply Operations in Sabah

A task force will be formed to coordinate the operations of electricity supply in Sabah and Labuan, said the Energy Commission's Chief Executive Officer Dato' Ir. Ts. Abdul Razib Dawood.

The task force, which will be chaired by the Energy Commission, would also consist of members from the Energy Commission of Sabah (ECoS), Sabah Electricity Sdn. Bhd. (SESB), independent power producers and other stakeholders in Sabah and Labuan.

"It will conduct monitoring every day. The operation will be 24/7 and 365 days to ensure a balance between supply and demand, thereby ensuring stable, reliable, and continuous electricity supply. It will also facilitate coordination, for example, when a power station requires maintenance work, it can be scheduled in advance or delayed ensuring sufficient reserve margin," according to Dato' Abdul Razib.

"This is an initiative under demand-side management to help reduce electricity consumption and prevent load-shedding. The Energy Commission also encourages people to choose energy efficient appliances that have a five-star rating under its Minimum Energy Performance Standards (MEPS), among others," he added.

New Straits Times, 23 May 2023

Malaysia to Roll Out Energy Transition Roadmap in Phases

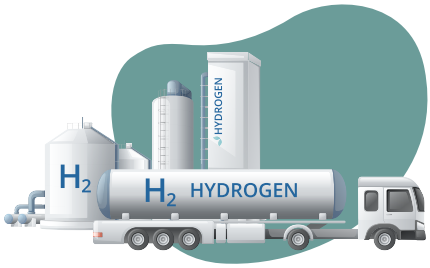
Malaysia is set to roll out its Energy Transition Roadmap in phases, putting the country's net zero ambition into action by identifying key impact initiatives and implementation plans for the next two decades. Minister of Economy, Rafizi Ramli said the roadmap outlines the Government's move to achieve its renewable energy capacity target of 70% by 2050.

"We will launch the first phase by end-June, which includes strategic projects and initiatives such as hydrogen and solar farms as well as a special zone for renewable energy. The second phase will be in August this year, involving the enablers - by that I mean legislative reforms, incentive fundings that are available to accelerate the transition," he told reporters at the Affin Conference Series 2023.

Earlier, in his keynote speech, Rafizi said a roadmap is an important step in putting money in strategic growth areas, not merely paying environmental sustainability lip service and no longer seeing economic growth and carbon emissions as incompatible goals.

"We estimate that this ambition would require an investment of RM637 billion (or USD150 billion), an amount that would substantially reshape the landscape and conversation about renewables in the region," he said.

New Straits Times, 30 May 2023



Sarawak Aims to be First Hydrogen-Driven Economy in Southeast Asia

Sarawak aims to be the first hydrogen driven economy in Southeast Asia by accelerating the use of greener hydrogen energy sources, said Premier Datuk Patinggi Tan Sri Abang Johari Tun Openg.

With International Energy Week (IEW) 2023 beginning on 13 June, firms from Japan and South Korea are looking into the possibility of collaborating with Sarawak to produce green hydrogen.

"They are looking into the possibility of working together to produce green hydrogen from our water," he said when officiating the Forest Conservation Conference.

Abang Johari said Sarawak is poised and committed to beginning large scale commercial production of green hydrogen by 2027, adding that the State Government is serious in advocating for green economy and mitigating climate change. He said transitioning to a hydrogen-driven economy will likely bring multiple benefits to Sarawak, including reduced carbon emissions, enhanced energy security and opportunities for economic growth and job creation.

Borneo Post, 12 June 2023

Experts: New Talent Needed for Transition to Renewable Energy

Despite commitments, advancing technology and adequate funding, the current state of the workforce in the energy industry poses a significant barrier to effectively and efficiently transition towards net-zero energy systems, says an expert.

Boston Consulting Group Chief Executive Officer Christoph Schweizer said there is a considerable gap in the workforce to successfully accomplish the commitments made towards achieving net-zero emissions. In order to achieve a net-zero scenario by 2030, he said it would be necessary to create about 30 million new jobs worldwide. Schweizer said Malaysia would require 200,000 new jobs.

"I don't think any education system and energy company around the world is currently set up to deliver on that number," he said during a plenary session titled "Transforming Talent: Creating Asia's Energy Workforce of the Future" at the international conference Energy Asia 2023.

The Energy Commission's Chief Executive Officer, Dato' Ir. Ts. Abdul Razib Dawood, in a panel discussion during Energy Asia 2023.

Experts also believe that the challenges facing energy companies in achieving this significant workforce requirement include the need for new profiles with expertise in renewable energy and the retention of skilled professionals for existing gas power plants while motivating them to transition.

Schweizer highlighted the necessity of fostering general workforce awareness and upskilling in climate and sustainability to ensure comprehensive education and action.

Meanwhile, another panellist, PETRONAS Group Human Resource Management Senior Vice-President Farehana Hanapiah pointed out that by 2050, Asia's fast-growing population is expected to have three billion people in the working age group. However, she believes that attracting new talent to the renewable energy sector can be challenging, as it requires educating, reskilling and transitioning from other industries. Farehana brings attention to the shortage of sustainability experts and expresses the need for diverse thinking to generate better solutions. She acknowledged the importance of providing the younger generation with the necessary education and opportunities to access high-value jobs.

Rather than relying on external assistance, Farehana emphasised the need to focus on internal resources and capabilities within Asia. "It is a challenging task, but I think we need to look at some of the opportunities that we can create from this demographic."

Similarly, Schlumberger East Asia Managing Director Meng Keong Lee suggests that it is the collective responsibility of everyone to impress upon the younger generation about the importance of addressing climate change and achieving sustainability goals. He emphasised the need to recruit, retain and redeploy individuals, which requires investments in retraining programmes. "While traditional engineering skills are still important, businesses need to supplement them with diverse competencies," he said.

The inaugural Energy Asia 2023 was attended by more than 4,500 delegates, over 100 speakers and 46 sponsors representing 19 industries from across 27 countries. There were 10,000 visitors to the Energy Asia exhibitions.

The Star, 29 June 2023

"Experts also believe that the challenges facing energy companies in achieving this significant workforce requirement include the need for new profiles with expertise in renewable energy and the retention of skilled professionals."

INTERNATIONAL

China Charts Course for Another Renewable Energy Boom in 2023

China is aiming to install more clean power in the course of 13 months which is more than what India and Japan have ever built combined. The massive spending on renewables comes as Beijing races to meet climate targets and reduce dependence on pricey foreign fuel.

It aims to have 430 GW of wind and 490 GW of solar power by the year-end, the National Energy Administration said in a roadmap that was released. That will be 118 GW of new solar over end-November levels, and an extra 79 GW of wind.

The clean energy spree is nothing new for China, which has by far the world's largest renewable power fleet. That hasn't stopped it from continuing to be the biggest greenhouse gas emitter, however, burning and mining more than half of the world's coal.

China is planning to build 2.9 GW of nuclear power this year, on top of the 55.5 GW online at the end of November, according to the energy roadmap. It aims to increase hydropower capacity to 423 GW from 410 GW at end-November.

Asia's largest economy is also looking to ramp up oil and gas production. It is targeting increases of around 3% this year for both natural gas and crude output.

The Edge Malaysia, 3 January 2023

Malaysia to Export 100 MW of Electricity to Singapore

Singapore will import 100 MW of electricity from Malaysia as part of a two-year trial, under a joint agreement between YTL PowerSeraya and TNB Power Generation Sdn. Bhd. (TNB Genco). This marks the first time that electricity from Malaysia will be supplied to Singapore on a commercial basis.

YTL PowerSeraya said the electricity will be exported via a newly upgraded interconnector. This will make up about 1.5% of Singapore's peak electricity demand, enough to power about 144,000 four-room Housing & Development Board (HDB) flats for a year.

"Both parties will work closely with the Energy Market Authority of Singapore (EMA) and the Energy Commission of Malaysia to refine all technical settings and regulatory arrangements under the Electricity Import Framework and the agreement will be effective upon fulfilment of conditions precedent," a joint statement read. The partnership was made official on Monday and was witnessed by Singapore's Manpower Minister Tan See Leng and Malaysia's International Trade and Industry Minister Tengku Zafrul Tengku Abdul Aziz.

Managing Director of TNB Genco Nor Azman Mufti said the agreement "is a positive step for the strengthening of cross-border energy supply towards the realisation of a fully interconnected ASEAN power grid. This will mark TNB Genco's maiden foray into the Singapore market via cross-border electricity sales and we hope this will become the catalyst to capture future projects in this market," he added.

"The move is part of Singapore's plan to strengthen the regional grid architecture," said Singapore's then Minister for Trade and Industry Chan Chun Sing in a keynote speech delivered at the opening of the Singapore International Energy Week in October 2021.

In response to Channel News Asia's queries on the possibility of a regional electricity market in the future, YTL PowerSeraya noted the increasing interest and discussion for energy diversification at the regional level.

"The clean energy spree is nothing new for China, which has by far the world's largest renewable power fleet."

"We see neighbouring countries planning for long-term initiatives for a more secure and sustainable future with the ASEAN power grid," it added.

Last June, Singapore started importing up to 100 MW of renewable hydropower from Lao PDR through Thailand and Malaysia, after an initial two-year power purchase agreement was signed between Keppel Electric and Lao PDR Electricite du Laos (EdL). Singapore intends to import up to 4 GW by 2035, to make up about 30% of the country's electricity supply in that year.

Channel News Asia, 30 January 2023

Vietnam Looks to Offshore Wind Power

Vietnam is developing a regulation framework for offshore wind activity as the country has embarked on a roadmap to reduce coal-fired power generation in an effort to achieve net zero carbon emissions by 2050, Xinhua reported, quoting a Vietnamese News Agency report.

Vietnam has untapped potential in offshore wind because of the strong winds and relatively shallow waters near populated areas, according to the World Bank, which estimates the industry could generate up to almost 30% of the country's electricity output by 2050.

The Southeast Asian country had set a production target of 7 GW from offshore wind and a targeted 16.12 GW from onshore wind by 2030, as it sees wind power as a breakthrough solution to accelerating the adoption of renewable energy and ensuring national energy security, according to the latest draft of the power development plan.

The country aims to raise its installed offshore wind power generation capacity to 64.5 GW by 2045.

The Star, 16 March 2023

Singapore to Import Low-Carbon Electricity from Cambodia

Singapore will soon be able to import 1 GW of low-carbon electricity from Cambodia in what will become the country's largest electricity import to date, said the Singaporean Energy Market Authority (EMA).

"The EMA has granted Conditional Approval to Keppel Energy Pte. Ltd. to import 1 GW of electricity from Cambodia into Singapore. This is the first Conditional Approval for electricity imports to be awarded by the EMA and it marks a significant milestone in Singapore's ambition to import up to 4 GW of low-carbon electricity by 2035," the EMA said in a statement. The imported electricity will be produced by low-carbon means, including hydro, solar, and wind power plants, and transferred via new subsea cables.

Singapore is among the countries poised to transition to a green economy. A spike in energy prices in 2022 only spurred Singapore's ambition to end its dependence on fossil fuels, reported Sputnik, a Russian State-owned news Agency and radio broadcast service.

Business Today, 17 March 2023

Clean Energy Sources Produced 39% of Global Electricity in 2022

The world is on course for the first annual drop in the use of coal, oil and gas to generate electricity outside of a global recession or pandemic, according to a new climate change report.

Renewables are now due to meet all growth in demand this year, claimed a new study titled the "Global Electricity Review 2023". The report says: "2022 will be remembered as a turning point in the world's transition to clean power", with non-fossil fuel-based energy sources now accounting for almost 40%.

Russia's invasion of Ukraine made many Governments rethink their plans amid spiking fossil fuel prices and security concerns about relying on fossil fuel imports.

"It also accelerated electrification; more heat pumps, more electric vehicles, more electrolysers. These will drive reductions in emissions for other sectors, and will put more pressure to build clean power more quickly," according to the study.

Wind and solar power now produce 12% of global electricity, with enough wind turbines added worldwide last year to power almost all of the UK. Around the world, solar grew by 24% last year, enough to meet the annual demands of a country as big as South Africa. Taken together with nuclear and hydropower, clean sources produced 39% of global electricity in 2022. This means energy produced last year was effectively the cleanest ever made.

The study looked at data from 78 countries representing 93% of global electricity demand.

CityAM, 12 April 2023 (published in OilPrices.com)

Lao PDR and Malaysia Collaborate on Clean Electricity

Electricite du Lao PDR (EdL) and TNB Genco signed a Memorandum of Understanding (MoU) on Thursday to explore energy investment collaborations in renewable energy projects in Lao PDR.

The MoU is the latest step in a long history between the Lao and Malaysian energy sectors, including the first cross-border power trade in the ASEAN region under the Lao-Thailand- Malaysia-Singapore Power Integration Project (LTMS-PIP).

During the MoU signing ceremony, Managing Director of EdL Chanthaboum Soukalom said that the MoU shows that power trade is possible in the region and is a step towards the realisation of the ASEAN Power Grid (APG).

Although Lao PDR is known as a hydropower-rich country in the region, it still has the potential to explore other clean energy sources, as the nation attempts to lead the region in clean energy production.

The LTMS-PIP was created to import 100 MW of renewable hydropower from Lao PDR to Singapore via Thailand and Malaysia using existing interconnections.

The Star, 29 May 2023

Farm Waste Fuels Energy Transition

Every day dozens of tanker trucks, many laden with animal manure and other kinds of agricultural waste, rumble through the gateway of an imposing steel and concrete plant in northeast Netherlands.

This pungent cargo will be mixed together into a slurry and pumped into massive tanks, where hungry bacteria will within weeks turn it into methane gas that will ultimately be sold to the energy grid to heat homes and generate electricity.

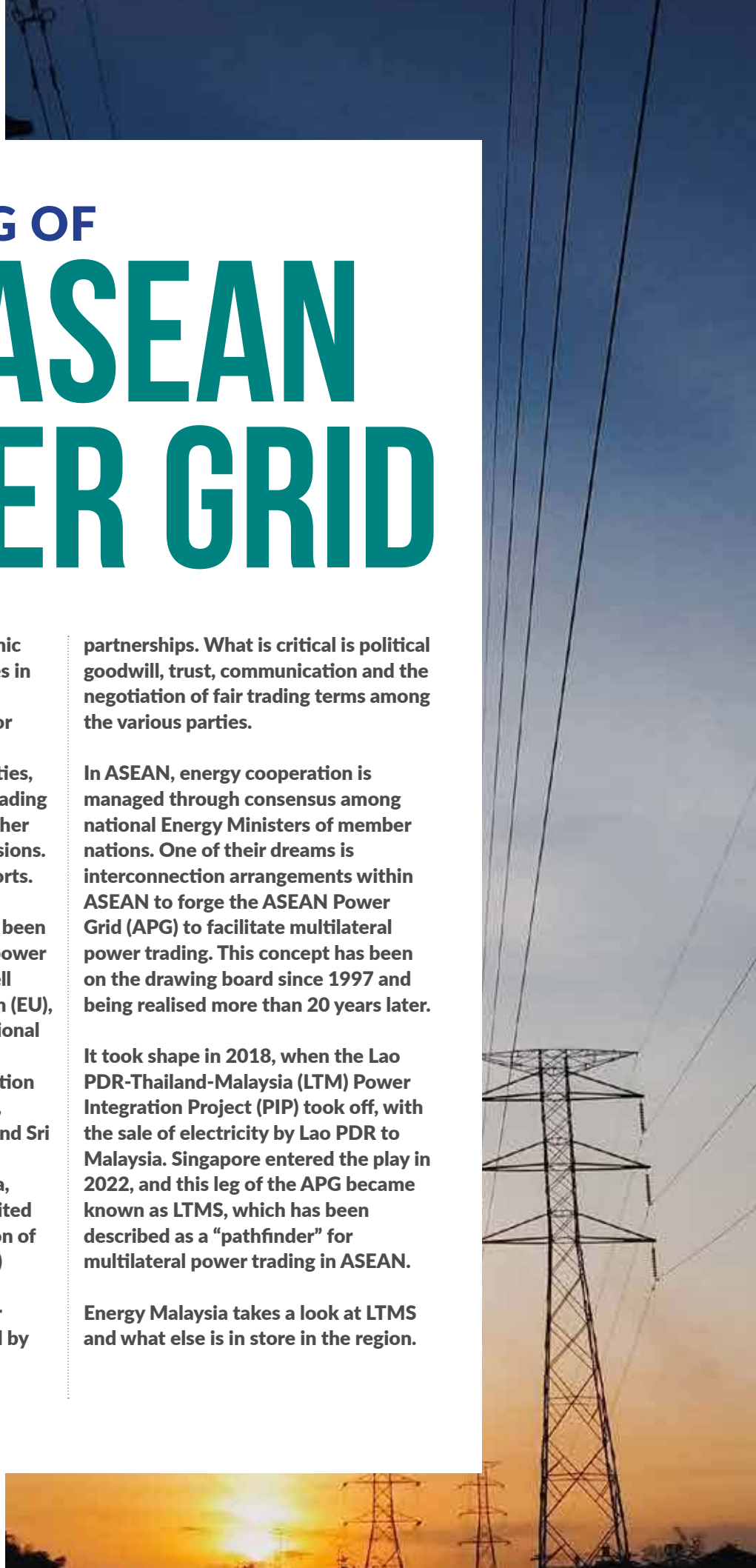
The gas is a biofuel – similar to the natural gas pumped out of offshore wells in the North Sea but because of its biological origins, is considered carbon neutral.

For the plant's main owner, Varo Energy, a privately held oil refiner in Switzerland that sells diesel and gasoline at service stations across northwest Europe, a biogas facility like this one represents the future – or at least a slice of it.

The European Union (EU) and national Governments like Switzerland are forcing suppliers of oil products to increase the proportion of the fuel they sell that comes from renewable sources to mitigate climate change. Russia's efforts to use natural gas as political leverage in the war in Ukraine have added to the urgency to end dependence on fossil fuels. As a result, companies that refine and sell oil are making significant investments that they would not have considered before.

The Star, 13 June 2023

"Biogas (methane) is similar to the natural gas pumped out of offshore wells in the North Sea but because of its biological origins, is considered carbon neutral."



THE MAKING OF THE ASEAN POWER GRID

Electricity has become an economic commodity, imported by countries in the interest of energy security, affordability and sustainability. For exporting nations, it is a form of revenue generation. For both parties, however, the viability of power trading is subject to market forces and other externalities such as political tensions. These will affect the price of exports.

While bilateral power trading has been around for decades, multilateral power trading is gaining momentum. Well established in the European Union (EU), this trend is being pursued by regional blocs such as the South Asia Association for Regional Cooperation consisting of Bangladesh, Bhutan, Nepal, India, Pakistan, Maldives and Sri Lanka; Gulf Corporation Council consisting of Kuwait, Saudi Arabia, Bahrain, Oman, Qatar and the United Arab Emirates; and the Association of Southeast Asian Nations (ASEAN) made up of member states. They already have in place cross border trading mechanisms implemented by regional energy transmission partnerships. What is critical is political goodwill, trust, communication and the negotiation of fair trading terms among the various parties.

In ASEAN, energy cooperation is managed through consensus among national Energy Ministers of member nations. One of their dreams is interconnection arrangements within ASEAN to forge the ASEAN Power Grid (APG) to facilitate multilateral power trading. This concept has been on the drawing board since 1997 and being realised more than 20 years later.

It took shape in 2018, when the Lao PDR-Thailand-Malaysia (LTM) Power Integration Project (PIP) took off, with the sale of electricity by Lao PDR to Malaysia. Singapore entered the play in 2022, and this leg of the APG became known as LTMS, which has been described as a "pathfinder" for multilateral power trading in ASEAN.

Energy Malaysia takes a look at LTMS and what else is in store in the region.

In 2018, the ASEAN Power Grid's (APG) first multilateral power trading arrangement was trailed by the Lao PDR - Thailand - Malaysia Power Integration Project (LTM PIP). It involved commercial transactions between three national utility companies, namely, Tenaga Nasional Berhad (TNB) Malaysia, Electricity Generating Authority of Thailand (EGAT) and Electricite du Laos (EdL).

Under LTM PIP Phase 1, Lao PDR was to sell power to Malaysia, via Thailand as the intermediary member state. A supply agreement was signed between EdL and TNB for the transfer of 100 MW of power between 2018 and 2019, via interconnections in the grid infrastructure of EDL-EGAT-TNB. There was also a System Access Agreement for wheeling charges to be paid to EGAT.

The first transfer occurred in 2019.

"LTM PIP was the testing ground for the grid and trade negotiations," says Nurhafiza Mohamed Hasan, the Energy Commission's Director of Industry Planning and Development. "Malaysia and Thailand have two interconnections, which are owned and operated by our respective national utilities. The Bukit Keteri, Chuping-Sadao interconnection has an 80 MW capacity and is used for smaller transfers. The Gurun-Khlong Ngae interconnection has a larger 300 MW capacity, and it was used for the LTM transfer.

Nurhafiza Mohamed Hasan
The Energy Commission's Director of Safety Regulation. During the time of interview, Nurhafiza was the Director of Industry Planning and Development.

"In the past, these interconnections facilitated power transfers during power outages or supply shortages in either country. These are friendly Government-to-Government arrangements. As a result, Malaysia has built a good relationship with Thailand over the years, and it served us well during the LTM PIP trade negotiations.

LAO PDR HYDRO WEALTH

In landlocked and mountainous Lao PDR, hydropower is a key driver of economic growth and revenue generation.

According to OEC World, in 2021 alone, Lao PDR exported **USD1.96 billion** in electricity. Electricity was the most exported product in the country that year.

Source: OEC World

"EGAT has been buying power from EdL since the 1980s, and there are several interconnections between the two countries. Many EGAT officials know the Laotian language and cultural nuances in such negotiations. As such, EGAT assisted Malaysia when communicating with the Laotians on Malaysia's terms and conditions," she explains.

LTM PIP is a milestone that addressed technical, legal and financial issues relating to multilateral electricity trading. Nurhafiza explains: "LTM PIP is a success in many fronts. We were able to negotiate agreements that were acceptable to all parties. Bilateral arrangements between two countries in comparison are relatively easy; whereas having three or more parties is more challenging, and we needed to accommodate many priorities to arrive at a consensus, the ASEAN way.

"The project also involved the harmonisation of technical codes of three different grids that operate on different frequencies and power ratings. The transfer showed us how the interconnected grid worked, and we now have a system that can be used for similar transactions in the future. This system, which comes under the purview of the Grid System Operator, can track transfers and wheeling on a daily basis."

When the LTM Phase 1 contract which only utilised existing network interconnections expired, Malaysia renewed it for another two years. Under Phase 2 (2020-2021), Malaysia bought another 300 MW from Lao PDR, but this time it was from hydropower since the country is racing to increase the share of renewable energy in its fuel mix.

"We also learned that such transfers are not necessarily smooth," adds Nurhafiza. "During Phase 2, there were delays due to the dry season in Lao PDR, that meant lower generation of hydropower. Additionally, the EGAT transmission line began to lag due to aging issues and needed to be rehabilitated. Since then, Malaysia and Thailand have agreed to share the rehabilitation costs of the transmission line because it is mutually beneficial."

Nurhafiza says, "In the longer term, multilateral and bilateral trading are safety nets for national energy security because there is always the option to import whenever there are domestic shortages.

"At another level, it creates opportunities for Malaysia to reduce investments in new plant-ups domestically, and to save the land and space for other uses. With power imports, Malaysia can also reduce its reserve margin, which stood at 38.6% end 2022 in Peninsular Malaysia and is targeted to reduce to 20% by 2040.

"Phase 2 of the LTM PIP also coincided with the COVID-19 crisis, when there was a sharp spike in gas and coal prices. Against this scenario, the hydropower we bought was not only cheaper, but also meant the injection of more renewable energy into Malaysia's capacity mix."

Multilateral Trading, the ASEAN Way

ASEAN's vision is to integrate the national power systems of its 10 member states to enable power trading. The ASEAN Centre for Energy says enhanced integration through the APG could "avoid adding 154 MW of capacity, saving USD1.87 billion by 2025," citing estimates of a 2010 study.

The International Energy Agency (IEA) says energy demand in the region is set to grow by around 3% a year to 2030, with three-quarters of that increased demand being met by fossil fuels, based on today's policy settings. Without stronger policy action, Southeast Asia's net oil import bill, which stood at USD50 billion in 2020, is set to multiply in size rapidly if high commodity prices endure.

It is critical for countries to improve energy efficiency, accelerate renewable power generation, and switch to low emissions fuels. "Regional integration and multilateral power trading can also help increase power system flexibility in Southeast Asia. This would expand balancing areas, allowing for efficient resource sharing, particularly for renewable resources," adds IEA in a 2022 report.

Six Principles of Multilateral Trading

In April 2017, the ASEAN Power Grid Consultative Committee agreed on six principles that are to underpin increased power integration in the region. They are:

1. Trading should be stepwise and voluntary.

2. Power trade should focus on gaps and excesses and not require the utilisation of all domestic generation plants in the regional market. It should also not interfere with the operation of national power systems.

3. National regulations should be complemented by regional coordination. Multilateral power trading can be achieved in incremental rather than transformational steps.

4. Multilateral trading should be supported by expanding the regional (cross border) power system infrastructure with a master plan developed with multilateral trading in mind.

5. Regional wheeling price model should be established.

6. Sustainable power systems should be in place to increase the deployment of variable renewable resources.

Source: ISEAS Issue 2022/19: The Intractable Challenges Facing the Energy Trade in Southeast Asia by Ryan Wong and Lee Poh Onn (ISEAS Yusof Ishak Institute)

Singapore Entry

In September 2021, Singapore completed the trading chain that is now known as LTMS, as originally intended. There were two reasons for the delay. One, unlike the LTM, Singapore has a market-driven electricity supply environment. Additionally, Singapore's proposal was deemed as being complex and not easily comprehended by the other parties who did not have an understanding of the market and framework proposed.

"In this instance, Malaysia stepped in to smoothen the process since we had first-hand experience with LTM PIP, and also because we are a wheeling country. Another cause for the delay was the COVID-19 crisis, when things were put on hold," said Nurhafiza.

In June 2022, LTMS became operational, for the transfer of 100 MW of renewable hydropower over a two-year period from Lao PDR to Singapore, via Malaysia and Thailand using existing interconnections. The LTMS also included a wheeling charge methodology applicable for a harmonised regional grid model.

LTMS is the ASEAN's first multilateral cross border power trading initiative across four countries, and involved the following players: EdL, EGAT, TNB and Singapore's Keppel Electric Pte Ltd.

Like with Thailand to the north, Malaysia has a long standing interconnection agreement with its southern neighbour, Singapore. It dates back to 1983 and is for power supply on a contra basis for grid stability. Not driven by profit, they address energy security and intermittency issues in either country. When supply is restored, there is an automatic system balancing to a net zero status. This is a friendly Government-to Government arrangement.

The Malaysia-Singapore interconnection is located at Plentong-Senoko. The undersea cables connecting the two grids were upgraded in 2022. In a statement (26 October 2022), the Singapore's Energy Market Authority (EMA) said: "The interconnector can now support bilateral electricity flows of roughly 1,000 MW between Malaysia and Singapore, following the conclusion of upgrading works in August this year. This is more than quadruple of its previous capacity and has improved regional energy interconnection."

This interconnection is being used for the LTMS power transfer.

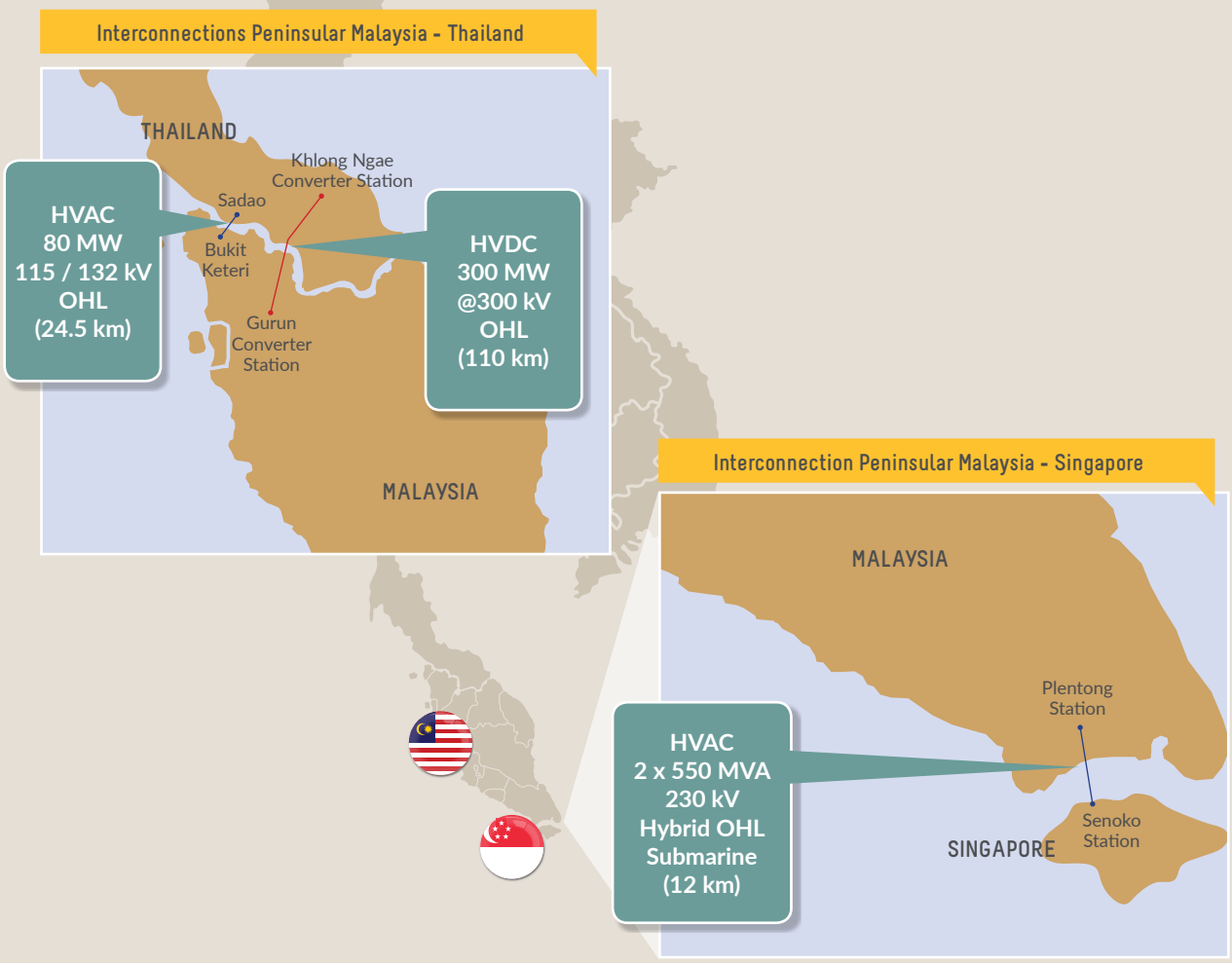
Singapore's purchase is strictly for Lao's hydropower, to meet its climate change goals and the high demand for renewable energy by multinationals and corporate companies that have their Environment, Social and Governance (ESG) commitments to fulfil. Heavily reliant on gas for power generation, Singapore benefitted from the LTMS arrangement because hydropower was much cheaper than gas at that point in time.

LTMS is the fruition of an ASEAN initiative that began in 2014.

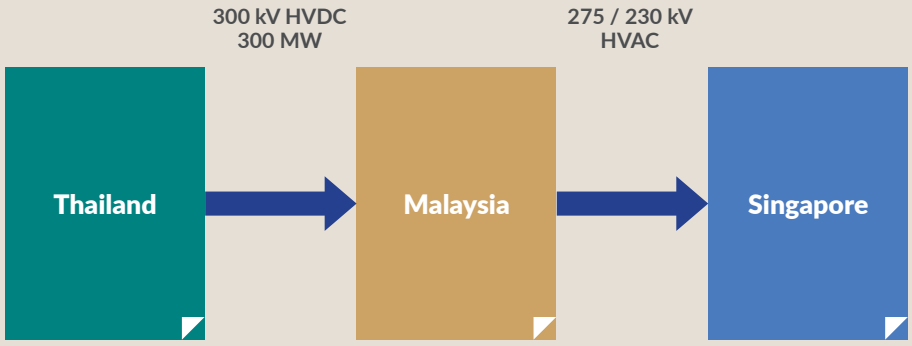
At the 32nd ASEAN Ministers on Energy Meeting (AMEM) held on 23 September 2014 in Vientiane, Lao PDR, Ministers welcomed the new initiative to undertake a pilot project to explore cross-border power trade involving four ASEAN member states. The pilot project, entitled "Lao PDR, Thailand, Malaysia, Singapore (LTMS) Power Integration Project (PIP)" was to serve as a pathfinder to enhance multilateral electricity trading beyond neighbouring borders towards realising the APG.

"The LTMS delay was caused by the lack of comprehension of the market environment and the complex framework that was proposed, therefore Malaysia stepped in to smoothen the process since our nation is a wheeling country and has first-hand experience with LTM PIP."

THAILAND - PENINSULAR MALAYSIA - SINGAPORE INTERCONNECTIONS



PHYSICAL FLOW



Source: Energy Commission

While looking to ASEAN for renewable power, Singapore is also scanning beyond the region. Requests for Proposals (RFPs) have been sent to Vietnam that is harvesting solar and wind power as well as to Australia. The idea of transmitting solar energy from Australia to Singapore has been around since 2014. The Northern Territory Government in Australia has crafted regulatory and incentive frameworks to attract solar farm investments.

In addition, Singapore is looking to Indonesia for renewable energy. It has invested in the construction of the world's largest floating solar PV system in Batam Island to the south. A large portion of the electricity generated will be transmitted to Singapore. Singapore is also said to harbour the ambition of becoming a regional power trading hub, an ambition also shared by Thailand.

"Singapore is said to harbour the ambition of becoming a regional power trading hub, an ambition also shared by Thailand."

Thailand's Ambition to be a Regional Power Trading Hub

Thailand is jump starting a decade-old plan to create a Southeast Asia electricity super grid and wants to be the power-trading hub at the centre of it, reported Bloomberg (26 August 2019).

The nation is set to triple the amount of electricity from Lao PDR that it resells to Malaysia, while encouraging infrastructure upgrades stretching from Cambodia to Myanmar necessary for cross-border power trading, said Wattanapong Kurovat, Director General of Thailand's Energy Policy and Planning Office.

The moves are part of Energy Minister Sontirat Sontijirawong's efforts to make Thailand's power system cleaner, cheaper and more efficient. The trade is simple, Wattanapong said. Thailand would buy more electricity for its own national grid from Lao PDR, which generates more than it needs from dams along the Mekong River and its tributaries. It would then have excess power in its own national grid that it could sell to Malaysia, Cambodia or Myanmar.

"We're trying to move quickly to become the centre of the region's power grid," Wattanapong said in an interview in Bangkok. "We already have the capacity and the infrastructure to support the vision to become the regional hub."

Being a hub would bring a myriad of benefits, Wattanapong added. Thailand could earn additional revenue from transmitting electricity across its power lines, address occasional capacity oversupply, and make better use of its existing infrastructure and power plants. By using its grid more efficiently, the cost of electricity in Thailand would be cheaper over the long-term, he said.

Trans Borneo Grid and Other Opportunities

Sabah is well on its way to achieving a 100% electrification rate with the completion of the Sarawak-Sabah interconnection, as part of the Trans Borneo Power Grid. It is an APG project aimed at encouraging the economic use of energy resources for mutual benefit. The project also aims to enhance power system reliability and security and open up opportunities for power trading.

In August 2021, Sabah Electricity Sdn. Bhd. (SESB) and Syarikat SESCO Berhad (SESCO), a subsidiary of Sarawak Energy Berhad (SEB), signed a Power Exchange Agreement and an Interconnection Agreement, which marked the journey towards the Trans Borneo Grid within the wider APG.

According to a statement issued by SEB, "The agreements will pave the way for an initial export of 30 MW for a term of 15 years via a 31 km 275 kV circuit transmission line, which will run from Lawas in Sarawak to Mengalong in Sabah. The interconnection is set to commence end 2023, once grid expansion under SEB's Northern Agenda has connected Miri to the northern towns of Limbang and Lawas in Sarawak."

Approved by the Electricity Supply and Tariff Planning and Implementation Committee (JPPPET), this is the first project connecting electricity between the two Borneo states. It is expected to facilitate economic collaboration between them and accelerate renewable energy transformation and support the economic growth of Borneo.

Equally significant is the fact that Sarawak will be exporting renewable hydropower to Sabah. Sarawak's electricity supply is predominantly from renewable sources, following its pivot to harness renewable energy resources under the Sarawak Corridor of Renewable Energy (SCORE) strategic initiative.

Earlier, in 2016, SEB commissioned Sarawak's first interconnection linking Mambong in Sarawak and Bengkayang in West Kalimantan. This is a flagship interconnection project in the Brunei, Indonesia, Malaysia and Philippines East ASEAN Growth Area (BIMP EAGA).

Besides the interconnector, a 120 km, 275 kV double circuit transmission line between Mambong and Bengkayang was also constructed. Known as the Sarawak-West Kalimantan Link, the entire project is a collaboration between SEB and PT Perusahaan Listrik Negara (PLN) of Indonesia, both State-owned power utilities.

Group Chief Executive Officer of SEB Sharbini Suhaili said, "I am pleased to note that since the interconnection, West Kalimantan has displaced some 50 MW from 130 MW of diesel power with electricity from Sarawak. We believe this translates into cost savings as well as lower carbon emissions for PLN and Kalbar, who are our first export customer."

PLN General Manager Bima Putrajaya acknowledged that the interconnection project had improved the economic sectors of West Kalimantan. He said, "Since the implementation of this project, we are able to provide sufficient power, and this has enabled other sectors that require electricity to complete their works within set time frames."

Another Malaysia - Indonesia project is the Peninsular Malaysia - Sumatra interconnection. In a media release in October 2021, Indonesia's Minister of Energy and Mineral Resources Arifin Tasrif said that Indonesia will supply electricity to Malaysia when the network transmission interconnection system is completed. The interconnection is scheduled for commercial operations in 2030.

He added, "An interconnection from Sumatra to Singapore is being studied in order to export electricity sourced from clean energy to the country."

Challenges: Technical and Financial Barriers

Power trading in ASEAN started at the bilateral level and is envisioned to scale up to trading between three subregions — north (ASEAN countries in the Greater Mekong Subregion), south (Malaysia and Singapore), and east (BIMP-EAGA countries).

Building the APG is a major undertaking that entails the development of hard and soft infrastructure, including transmission facilities and electricity trading mechanisms. Several challenges lie ahead before the full-scale APG can be realised. These include overcoming technical and financial barriers.

In a podcast interview with the Asian Development Bank Institute on September 2022, ASEAN Centre for Energy Executive Director Nuki Agya Utama said the next challenge will be adding a submersible line from Singapore to Sumatra, Kalimantan, Sabah, Sarawak, and Brunei to the Philippines.

He said deploying a submersible high-voltage line, which is quite costly, is one of the technical challenges. "However, the latest studies between Singapore and Sarawak authorities have revealed the possibility to transfer it both ways — from Singapore to Sarawak and from Sarawak to Singapore. The result of the feasibility studies conducted looks very promising.

"Another challenge is that ASEAN member states will need to invest in transmission grid upgrades to absorb the high penetration of variable renewable energy," he says. "Of course, the grid should be able to transfer power to areas where the demand is, which is a very challenging process.

"Another challenge is that ASEAN member states will need to invest in transmission grid upgrades to absorb the high penetration of variable renewable energy."

"Additionally, the variable and intermittent nature of wind and solar power generation makes it challenging to integrate these renewable sources into traditional power systems and maintain a reliable supply of electricity. The traditional large-scale electricity delivery system is centralised and unidirectional. Integrating renewable energy from different sources, such as solar photovoltaic farms and wind farms, at different places will require power systems to be more flexible and smarter," he noted.

Interconnections, the EU Way

In the mature energy market of the European Union (EU), interconnections are not voluntary like in ASEAN. Instead, targets are set to achieve infrastructure integration to facilitate power trading.

The target is for at least 15% by 2030, to encourage EU countries to interconnect their installed electricity production capacity. This means that each country should have in place electricity cables that allow at least 15% of the electricity produced on its territory to be transported across its borders to neighbouring countries.

The previous interconnection target of 10% by 2020 stemmed from a call of the European Council in October 2014, but was raised to 15% by 2030 following the Regulation on the Governance of the Energy Union (2018/1999).

In 2021, 16 countries reported being on track to reach that target by 2030, or have already reached the target, but more interconnections are needed in some regions. The 15% cross-border capacity ratio corresponds to the import capacity of EU countries' installed generation capacity.

EU power transfers are coordinated by entities such as the European Network of Transmission System Operators for Electricity and the Agency for Cooperation of Energy Regulators that help align efforts across more than 30 countries. For technical cooperation, member states can turn to the Energy Infrastructure Forum, while investment needs are addressed by the EU funding instruments such as the Connecting European Facility.

DECARBONISATION WITH COGENERATION

With Governments and industries around the world accelerating efforts to reduce greenhouse gas emissions, cogeneration has proven to be yet another tool in the battle against climate change. Also known as combined heat and power (CHP), cogeneration is a cleaner, more efficient approach to generating on-site electric power and thermal energy from a single fuel source.

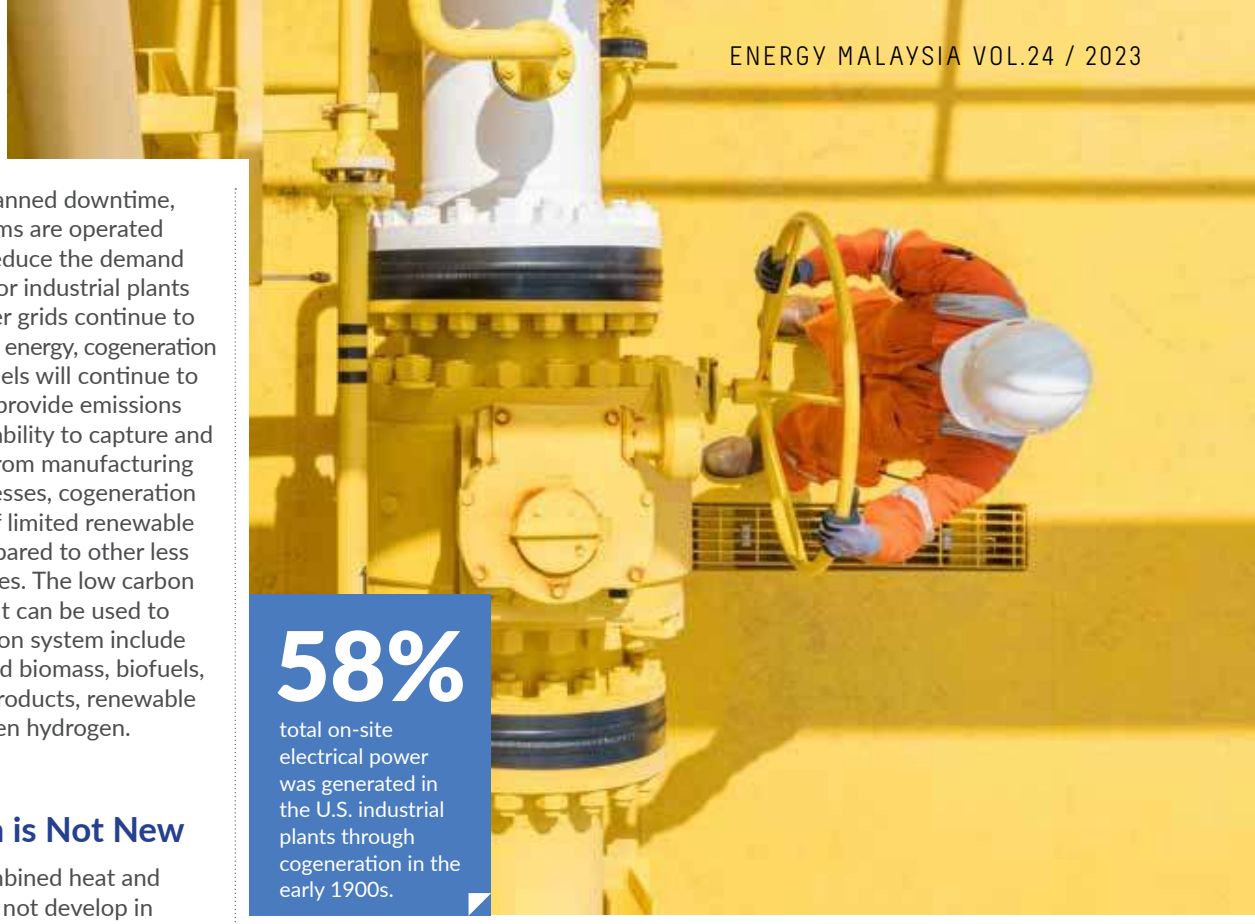
It is able to utilise several different technologies and fuels to convert energy to heat, cool, and provide electricity for industrial plants and facilities – all while lowering greenhouse gas emissions and avoiding the need to generate, transmit and distribute electricity from the grid.

Power plants and industrial facilities generate a lot of heat during their processes. If this heat is released into the atmosphere as exhaust fumes, it represents a huge waste of energy. Most of that heat can be repurposed and turned into electricity and thermal heating and cooling and be put back into use by these plants and facilities.

Cogeneration requires less fuel to produce a given energy output, and avoids the transmission and distribution losses that occur when electricity travels over power lines. By capturing and using heat energy that would otherwise be wasted, cogeneration systems operate far more efficiently than grid electricity and on-site heating and cooling. Depending on how it is applied, it can be 50-80% more efficient than producing energy from two separate sources – thereby lowering operational costs, boosting self-sufficiency and reducing carbon emissions.

50% - 80%

of cogeneration systems can operate far more efficiently than grid electricity and on-site heating and cooling.



Unless there is a planned downtime, cogeneration systems are operated continuously and reduce the demand for grid electricity for industrial plants that use it. As power grids continue to use more renewable energy, cogeneration using low carbon fuels will continue to work in tandem to provide emissions benefits. With the ability to capture and utilise waste heat from manufacturing and industrial processes, cogeneration makes better use of limited renewable fuel resources compared to other less efficient technologies. The low carbon renewable fuels that can be used to power a cogeneration system include agricultural and solid biomass, biofuels, landfill gas, wood products, renewable natural gas and green hydrogen.

Cogeneration is Not New

The concept of combined heat and power certainly did not develop in recent times. Europe and the U.S. have used forms of cogeneration as early as the 1880s. During those times, many industries used their own coal-operated power plants to generate the electricity that powered their mills, factories or mines. The steam that was produced as a byproduct was used as thermal energy for various industrial processes or to heat the space. In the early 1900s, cogeneration systems produced about 58% of the total on-site electrical power generated in industrial plants in the U.S. That percentage plummeted to only 5% by 1974, according to a research paper "Cogeneration: Technologies, Optimization, and Implementation."

There were many reasons for that sharp decline. Electricity from central grids became more reliable and cheaper to buy and fuel became available at a low cost, making privately owned coal-fired on-site power plants less attractive to invest in. Also, Governments in Europe and the U.S. tightened regulations and imposed more restrictions on electricity generation. However, when fuel costs skyrocketed in 1973 and awareness of the harmful effects of environmental pollution grew, cogeneration became highly relevant again.

58%

total on-site electrical power was generated in the U.S. industrial plants through cogeneration in the early 1900s.

The Users

Uninterrupted electricity is crucial for business and industrial sectors. Since cogeneration systems are designed to operate 24 hours a day and independently from the grid, it continues to play a valuable role in providing energy reliability and resilience for utilities, businesses and corporates. As a distributed resource, cogeneration also puts less load on the grid, which means it enhances grid stability and relieves congestion on the grid.

While the industrial sector has a massive need for heat and electricity, some industries primarily use heat, for example like metal manufacturing, and some use mostly electricity. Other industries require heat and electricity in varying ratios.

The effectiveness of a cogeneration system across various industrial sectors that use it has the potential for encouraging private investments in energy efficient technologies. It could also generate business opportunities and stimulate the growth of SMEs in manufacturing, heavy industry and the renewable energy sectors. In turn, it will create jobs for more people in these industries.

In Malaysia, the Government introduced the New Enhanced Dispatch Agreement (NEDA) in 2017 to spur the take up rate of combined heat and power investments. Prior to this, operators of facilities that use cogeneration systems could not sell excess generated electricity back to the grid unless there was a power purchase agreement with the utility provider. This prevented the widespread use of cogeneration in business and industry, particularly with small and medium sized players – the significant investments needed did not commensurate with the potential upside of cost savings through energy efficiency.

"NEDA has provided a platform for cogenerators without power purchase agreements, to be able to export and sell excess electricity back to the utility provider as long as they meet the criteria set by the Energy Commission."

Malaysia's Cogeneration Take Up

As part of its commitment to the New Energy Policy towards net zero carbon emissions by 2050, Malaysia is encouraging companies in the industrial sector to adopt cogeneration systems as part of their mission to save energy, reduce operating costs and contribute towards a cleaner environment.

The Pengerang Cogeneration Plant (PCP) was built by PETRONAS, as part of its Pengerang Integrated Complex (PIC) located in Johor, to serve as a cogeneration hub for its vast industrial complex – comprising the refinery and petrochemicals integrated development (RAPID) project and other ancillary facilities, including the Pengerang LNG Regasification terminal, air separation unit, raw water supply project (PAMER), crude and product tanks, and centralised and shared utility facilities. The cogeneration plant here is expected to generate 1,220 MW of electricity and provide a continuous supply of steam up to 1,480 tonnes per hour for plants within the industrial complex. The plant became operational in mid-2017.

The Malaysian Gas Association (MGA) is actively promoting cogeneration to achieve national energy efficiency targets. They believe that cogeneration is able to significantly increase the efficient use of energy, which makes it an integral contributor in achieving the national targets of 8% energy savings by 2025 and a reduction of greenhouse gas emissions by 45% by 2030.

MGA has also been taking part in engagements and dialogues with stakeholders to advocate greater adoption of cogeneration in the country. At the Benefits and Awareness of Cogeneration workshop in Kuala Lumpur in 2019, MGA called for the Malaysian Government to develop a comprehensive policy that is designed to facilitate the expansion of cogeneration use for industries in the country – while aiding companies to adopt it through incentive schemes.

In April 2022, MGA organised a site visit to a cogeneration plant by the Malaysia Digital Economy Corporation (MDEC). As a Government Agency, MDEC is responsible for facilitating investments in data centres and is committed to learn how cogeneration can provide an efficient and reliable source of cooling and electricity for their data centres. The plant is owned and operated by Gas District Cooling, Malaysia's largest district cooling provider serving Putrajaya, Kuala Lumpur City Centre (KLCC) and Kuala Lumpur International Airport (KLIA).

Delegates from MDEC were briefed on the importance of providing cool air for many buildings from a single central source instead of each building relying on an individual cooling system – thereby making these buildings more energy efficient.

Gas District Cooling operates eight district cooling plants using a cogeneration system with a total combined capacity of 59 MW of electricity, 442 tonnes / hour of steam, and 147,000 RT and 238,000 RTh of chilled water.

"To date, cogeneration has a proven track record of achieving RM1.4 million in energy savings per year based on every 1 MW of electricity generated." - Malaysian Gas Association

COGENERATION IN MALAYSIA: A REGULATORY PERSPECTIVE

The Energy Commission's Deputy Director of the Electricity Licensing Unit Zamali Zamin sheds light on the regulatory requirements and status of cogeneration in Malaysia today.

How is cogeneration regulated in Malaysia?

Cogeneration is considered to be an electrical installation under the Electricity Supply Act 1990. Every type of electrical installation needs to have a licence issued by the Energy Commission under Section 9 of the Act.

When did such regulation begin?

Cogeneration in Malaysia was first adopted by chemical and petrochemical factories, where production processes need vast amounts of electricity and steam. Our licensing records indicate that the earliest cogeneration licences were issued to the PETRONAS Methanol Plant in Labuan in the late 1990s. This plant was the first in Malaysia to invest in cogeneration technologies that involved taking power from the grid to produce gas at the plant, and subsequently use their cogeneration system to convert it to electricity and steam.

The next cogeneration project to be issued a licence was the PETRONAS Utility Facility in Gebeng, Terengganu. Their cogeneration facility was installed by PETRONAS Gas and a licence was issued in the early 2000s.

Zamali Zamin
The Energy Commission's Deputy Director of Strategy and Policy Development Unit. During the time of interview, Zamali was the Deputy Director of the Electricity Licensing Unit.

Who are the primary users?

The primary users of cogeneration systems in Malaysia are oil & gas facilities, petrochemical plants, pulp and paper mills, glass and glove factories because of their massive need for electricity and steam in their industrial and manufacturing processes. Usually, when companies in these industries devise their business model, they study how energy can be used more efficiently to achieve cost savings.

What is the take up rate for cogeneration?

Every year, the Energy Commission issues an average of 10 cogeneration licences. There are special conditions to follow when applying, which comes in two parts, namely technical and commercial requirements. For technical requirements, the applicant must conduct a power system study for either a new plant that is not operational yet or for a plant that is operational and wants to reduce its energy consumption. The basis for this requirement is to ensure that the grid can be connected to their system and the fault level of the grid can support the cogeneration usage of the plant.

For the commercial part, the applicant must be prepared for a standby and top-up charge. When they sign a contract with Tenaga Nasional Berhad (TNB), they have to declare their power demand requirements as a standby so that TNB is able to provide the infrastructure support for them. For example, if the power demand for a plant is 20 MW and their cogeneration system uses 10 MW of electricity, they have to declare these figures. In the event the cogeneration system is shut down for routine maintenance, TNB will provide the additional 10 MW of electricity until it is operational. The top-up would be the extra electricity charges imposed when TNB supplies electricity while their cogeneration system is in shutdown mode.

How does the Energy Commission monitor cogeneration plants?

When it comes to monitoring, we look at safety first and foremost. Our regulatory requirements state that industrial plants and facilities with energy capabilities of 11 kV and above must engage a qualified electrical engineer and assisted by a qualified chargeman to handle safety checks and audits of the cogeneration system – both are required to be appointed by the company.

What are the safety risks of cogeneration systems?

Cogeneration does not pose a high safety risk as long as the licensees follow all the safety standards. So far, we have not had any safety issues and no accidents. These cogeneration systems are installed by big players in their respective industries, so they are stringent in complying with safety procedures.

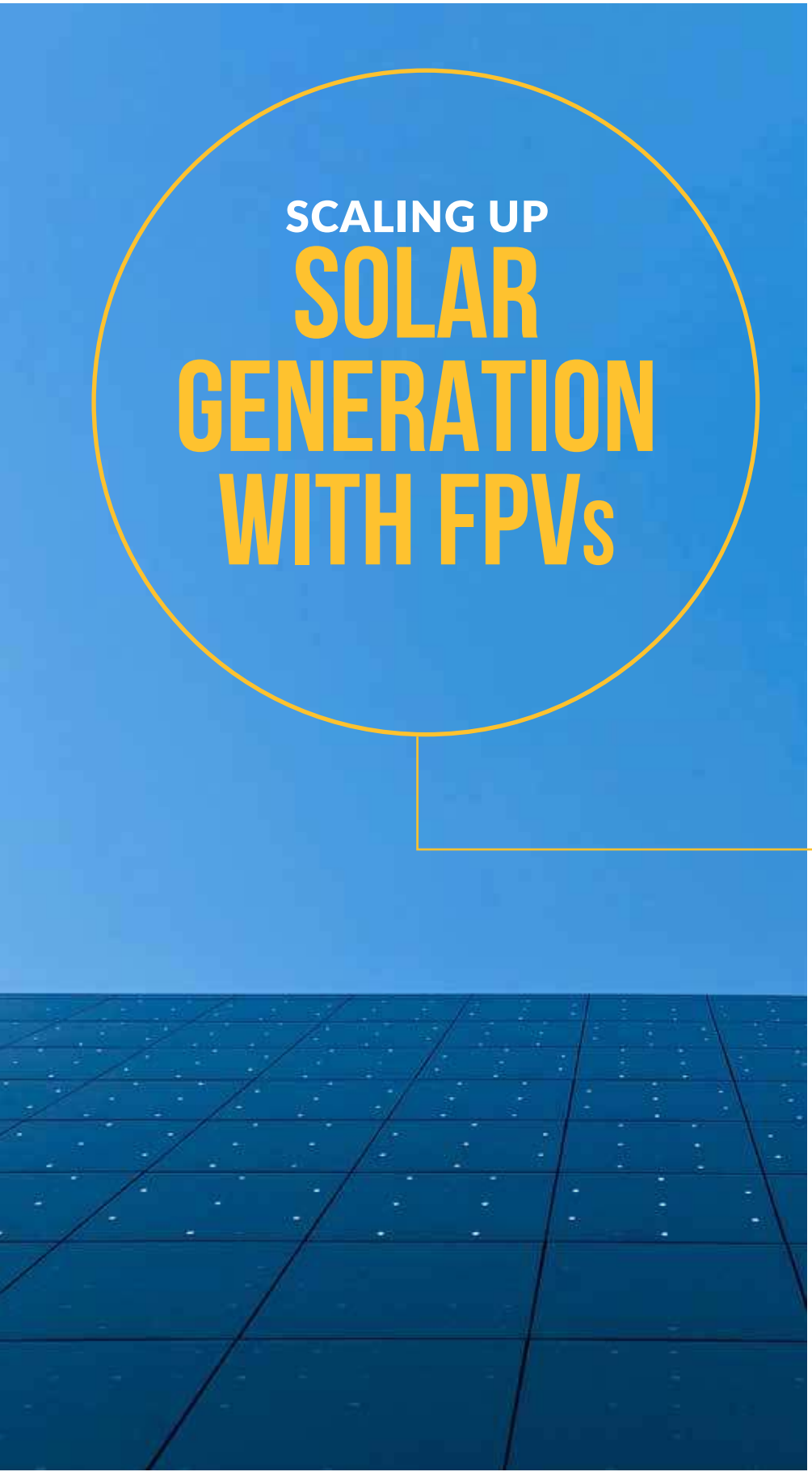
There have not been any cases of cogeneration licences being revoked by the Energy Commission. Companies that surrender their licences do so because they can no longer cope with the cost of operating the system as a result of financial constraints or business closures.

How is Malaysia promoting cogeneration?

The roll out of the New Enhanced Dispatch Agreement (NEDA) by the Energy Commission has enabled the power grid to leverage on the high efficiency of cogeneration as a tool to reduce the load on the grid as well as selling of excess electricity back to the grid. NEDA is essentially a commercial agreement between the companies and utility providers. The idea behind it is that when a plant has to temporarily halt its cogeneration system for maintenance, the company will have the assurance that the utility provider will continue to supply electricity or gas to their facility at an agreed fee. In this instance, utility providers include TNB, PETRONAS or other independent power and gas producers.

We have also widened this scheme to include renewable energy through NEDA+, which includes Large Scale Solar (LSS) players. In the future, we will need to increase our capabilities to produce more natural gas and renewable energy fuels to meet increasing demand for cogeneration in Malaysia.

The Energy Commission has an e-publication on Cogeneration which can be downloaded from www.st.gov.my.



SCALING UP SOLAR GENERATION WITH FPVs

The sun, recognised as a powerful source of clean, green and sustainable energy, is playing a pivotal role in the global effort to mitigate climate change. Photovoltaic (PV) panels mounted on building rooftops or stretching for miles in solar farms are common in many parts of the world today. In 2007, the first floating solar plant made its appearance in Aichi, Japan, followed by the first commercial installation of a 175 kW plant in the U.S. in 2008.

Since two-thirds of the planet's surface is covered by water, there is a strong case for Floating Solar Photovoltaics (FPVs), which offer the promise to solve several of the problems plaguing conventional land-based solar energy generation. One of the fastest-growing power generation technologies today, FPVs are opening up new horizons to scale up solar power capacity globally, especially in countries with high population densities and competing land uses. According to various reports, the capacity for floating solar is set to grow exponentially.

Although Floating Solar Photovoltaics (FPVs) are more challenging and costlier to build and operate than land-based solar farms, floating solar capacity is growing rapidly – from 70 MW of peak power (MWp) in 2015 to more than 1,300 MWp in 2018. Today, there are more than 300 FPV installations worldwide, with China as the world leader with tens to hundreds of megawatts (MW) of floating solar plants. A report by Wood Mackenzie, a global research firm, estimates that total global demand for floating solar will reach 4 GW in 2026, up from 1.6 GW in 2021.

FPVs are built to float on water bodies, thereby reducing the amount of land required to produce renewable solar energy. Suitable water bodies are industrial ponds, agricultural and hydropower reservoirs, dams, lakes and offshore waters. Project designers can make FPVs in various shapes and sizes to fit the location. This will free up valuable land for agriculture, infrastructure development and other uses.

Large floating solar plants reduce evaporation processes since the PV panels cover much of the water surface. This will assist in the conservation of water while keeping the PV module cool thus improving the performance of the FPVs by 5% to 10%.

According to a PV Magazine article in February 2023, Brazilian and U.S. researchers have evaluated the reduction rate of water evaporation to be 60% in a case study conducted on a 130 kW FPV installation in the Passaúna reservoir located in the Brazilian State of Paraná. They also claimed that a 5 MW system could save about 16,000 m^3 of water, which is equivalent to the consumption of 196 people per year.

The cooling effect of water bodies protects the floating PV panels from heat damage and maintains their efficiency for a longer duration. In comparison, the efficiency of rooftop solar panels declines with time due to continuous exposure to extreme sunlight. As such, although the initial deployment cost is high, FPVs deliver significant cost savings over time.

Another advantage is increased efficiency arising from its function as a booster for hydropower. When installed on hydroelectric dam reservoirs, FPVs limit evaporation and preserve more water for hydropower generated electricity. Additionally, the installations here can be connected to the existing power grid, making it more cost-effective and having a lesser environmental impact than land-based solar farms.

Another environment friendly feature of this solution is that it improves water quality because the panels inhibit algae growth that are harmful for human consumption. Therefore, FPVs play an important role in maintaining water hygiene.

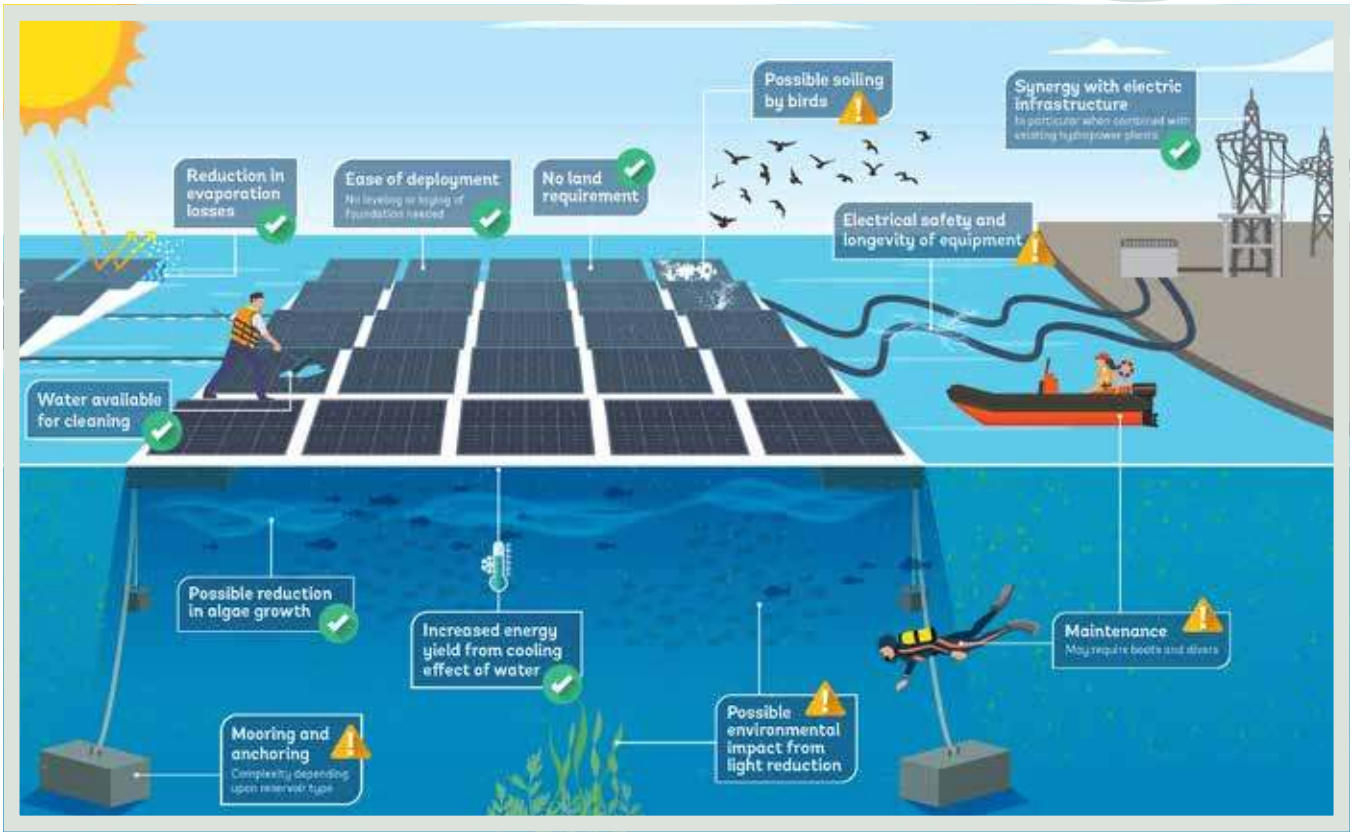
For all their advantages, FPVs also come with some serious challenges. While they can be built to last for 25 to 30 years, corrosion can reduce their durability and require more maintenance, especially in waters with high sodium levels. Systems that are poorly designed, installed and maintained could trigger power breakdowns.

The other downside is system cost, which is estimated to be at 20-25% higher and is incurred mainly by the floating structures, anchoring and mooring systems. Another issue is development costs. Engineering and construction costs for FPVs are higher than that of land-based solar farms.

Site selection is also equally critical. Developers have to carefully select sites that are suitable to construct FPVs. This requires extensive feasibility studies and finding the best location to install anchors for the floats. Anchoring serves to spread loads generated by wind and waves and prevents panels from hitting the banks of the water body or being blown away during storms. Only then can these projects be commercially viable.

"An FPV system with a capacity of 5 MW could save about 16,000 m^3 of water, which is equivalent to the consumption of 196 people per year."

BENEFITS AND CHALLENGES OF FLOATING SOLAR



Source: Where Sun Meets Water: Floating Solar Market Report, Energy Sector Management Assistance Programme (ESMAP)

Ecologically, FGVs interrupt marine life. They also tend to occupy water bodies that could be used for recreational purposes. Typically, floating solar farms are located on man-made water bodies to minimise their impact on the environment, but policymakers have to decide on what is their priority at the site: power generation or recreation?

FPV Boom in Asia

FPV technology is likely to play a major role in many Asian countries aspiring to achieve net zero carbon emission targets over the coming decades. Asia, being the most populous part of the world with 4.7 billion people as of November 2022 (UN estimates), has only 30% of the world's land mass. Given its high population density, the continent is fast-tracking the development of FPVs as an alternative solution to help meet its renewable energy goals.

In East Asia, where most available land for large-scale solar farms is already allocated for buildings, industry and agriculture, FPVs are expected to play a crucial role in transforming energy portfolios.

FPV installations in Asia began in Japan in 2007, and they were mainly small to mid-sized farms under 5 MWp. Since then, around 180 MWp of floating solar projects have been commissioned. China currently leads in FPV installations, closely followed by India and South Korea. Although Japan has the largest number of completed FPV projects of any country, Malaysia, Indonesia, Vietnam, Thailand, Lao PDR, Bangladesh and Sri Lanka are also emerging markets for larger projects.

"Although the market is still nascent and challenges in deployment remain, the floating solar market is set to accelerate as the technologies mature."

The Asian Development Bank (ADB) has been instrumental in expanding this technology; its FPV regional development project in 2018 has already strengthened FPV usage, especially in East Asia.

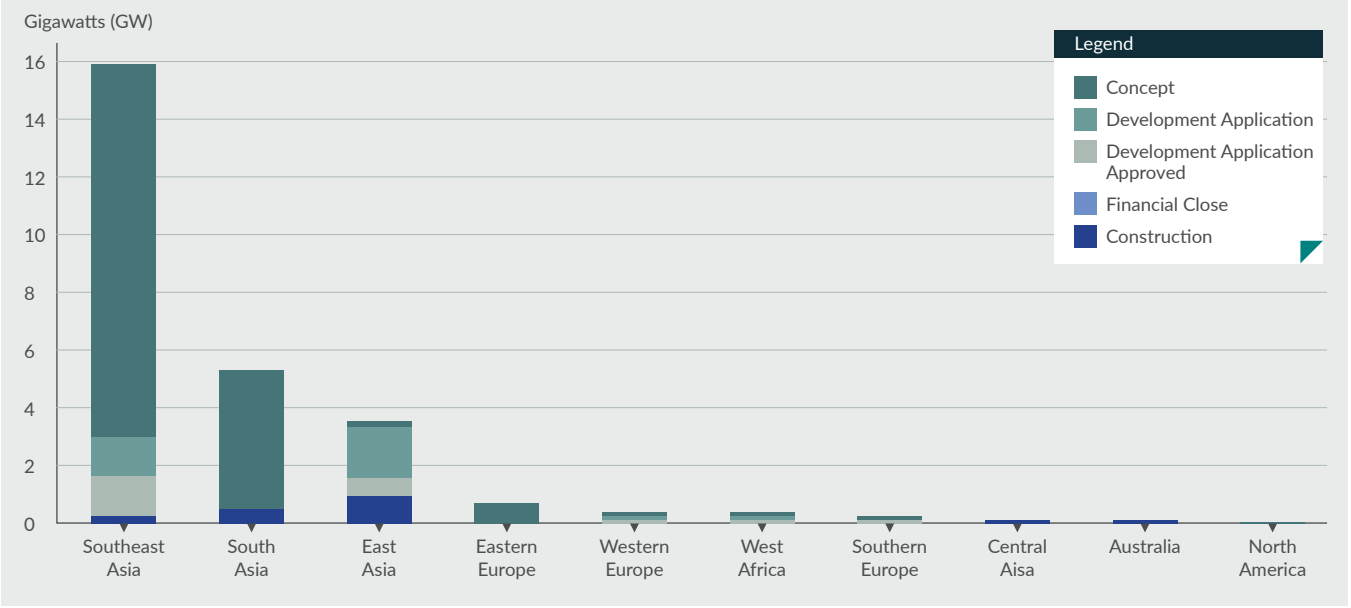
The Asia-Pacific region already dominates the fast-emerging market in FPVs, and it is looking to build on this position as more nations get on board and costs fall. The region is set to increase its market share from 74% in 2020 to 87% in 2026 in terms of global installed FPV capacity. Wood MacKenzie had identified 10 countries riding this wave, of which eight is sitting within the Asia-Pacific.

With the majority of FPVs located in Asia, there has been an emergence of Asian companies as investors and technology partners, who are also expanding their wings to other parts of the world.

The ASEAN Surge

Geographically blessed with vast amounts of water both inland and around it, Southeast Asia is supercharging with the development of floating solar power. Analysts at Rystad Energy believe that Southeast Asia could become the largest FPV market in the world with several significant projects planned this decade, says Damon Evans *(Energy Voice, 02 November 2021)*.

FLOATING SOLAR PV PROJECT PIPELINE 2021-2030 BY REGION



Source: Rystad Energy

For Singapore, Sunseap Group, the region's leading sustainable energy provider, is developing one of the world's largest floating solar arrays along the Straits of Johor. According to the firm, the project that is roughly the size of five football fields will generate enough solar energy annually to power about 1,250 four-room apartment units. The outcome is the reduction in greenhouse gas emissions of about 2,600 tonnes every year, over the next 25 years.

In Vietnam, the Da Mi Floating Solar PV Park was commissioned in 2019 as the first large-scale FPV in the country. Owned and developed by Da Nhim Ham Thuan-Da Mi Hydropower, a subsidiary of Vietnam Electricity, it was built on an existing 175 MW hydropower plant in southeast Vietnam. Occupying 50 hectares, the 47.5 MW project consists of 143,940 modules, each with 330 W nameplate capacity and can generates 70,000 MWh of electricity. The power generated is sold to Vietnam Electricity under a power purchase agreement for a period of 20 years, starting from 2019.

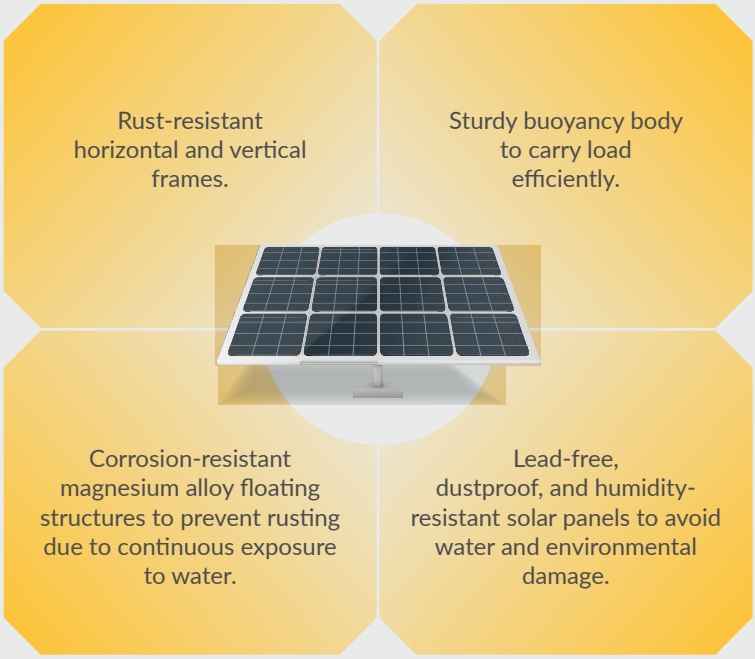
In Indonesia, the Cirata Reservoir in West Java is the site of the country's first FPV. Scheduled for operations in 2023, the 145 MW Cirata FVP will be one of the largest of its kind in Southeast Asia. Its success is expected to be the launchpad for more FPVs in other reservoirs across Indonesia.

Thailand has an energy masterplan that includes the installation of FPVs in eight hydropower plants around the country with a total capacity of 1,000 MWp over the next two decades. The success of the earlier 5 Dams-5 Provinces FPV project is serving as the country's benchmark for future projects.

The growth in FPV has proven to be a worthy contender in the race to combat climate change. As the technology develops further, the costs and technical challenges are expected to decline. It is also likely to become a more viable option in the face of population growth and urbanisation in developing countries where land will be needed for other more pressing needs.

FPV INSTALLATION

Floating solar plants face constant exposure to harsh climatic conditions. For better longevity, this solar module must have the following features:



FPV investors and users must also commit themselves to the following:

01 Ensuring mandatory use of high-quality materials to keep the panels afloat and prevent rusting and corrosion.

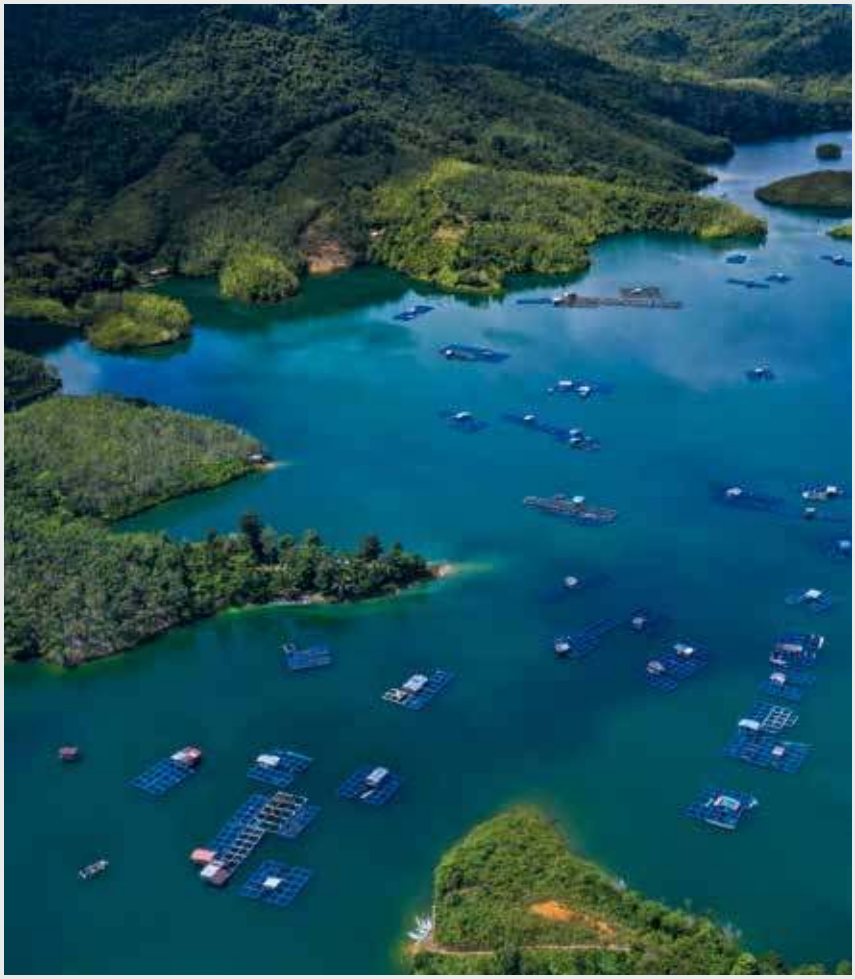
02 Making provisions for climate change that can cause harsh damage to the FPV installation.

03 Avoiding using unskilled workforce to install the solar panels on water bodies.

04 Investing in high quality floating solar systems for a technically sound power generating plant.

05 Knowing that this system is not applicable for domestic purposes because it entails a significant investment.

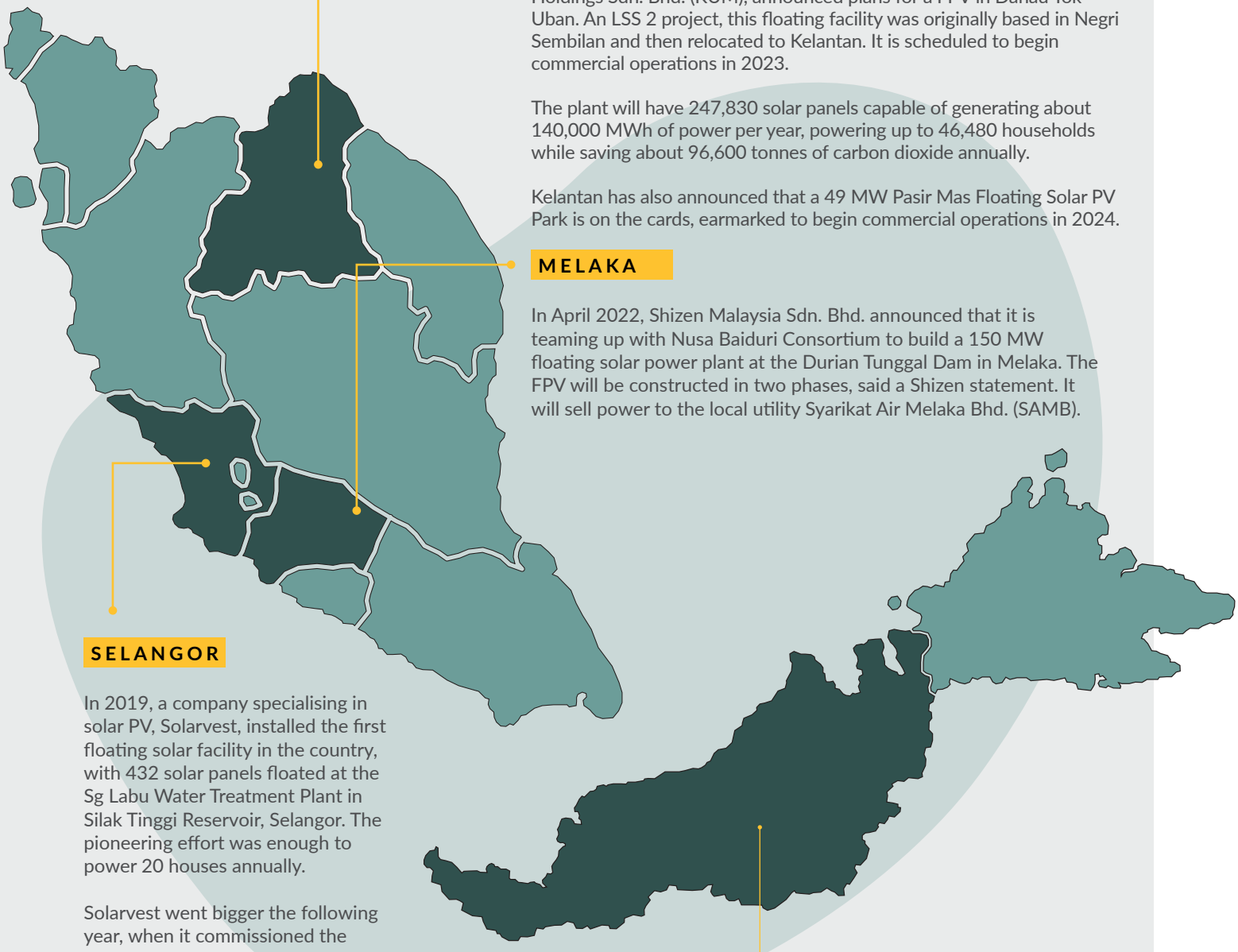
FPVs in MALAYSIA



As one of the largest solar PV manufacturers in the world, Malaysia is well-placed to join the FPV race. The other factor favouring FPVs in the country is the existence of numerous water bodies that can be used as sites. In Selangor alone, where population densities and power demand are high, there are more than 50 lakes that can be converted to become floating solar sites.

The Energy Commission's Large Scale Solar (LSS) Programme has been instrumental in the commissioning of FPV plants in the country. Between 1996-2022, there were four tender invitations (LSS 1- 4) for companies to submit proposals to build solar farms. Among the submissions, five were for the development of FPVs.

Since 2019, there has been an increase in FPV capacity, with several projects in different stages of development. They are located across the country, from Selangor to Kelantan, Sarawak and Melaka, some with commitments to FPV capacity that will make them among the largest in the world.



KELANTAN

In 2021, Cypark Resources Bhd. and Cove Suria Sdn. Bhd. with their co-partner, State Government Agency, Kelantan Utilities Mubaarakan Holdings Sdn. Bhd. (KUM), announced plans for a FPV in Danau Tok Uban. An LSS 2 project, this floating facility was originally based in Negri Sembilan and then relocated to Kelantan. It is scheduled to begin commercial operations in 2023.

The plant will have 247,830 solar panels capable of generating about 140,000 MWh of power per year, powering up to 46,480 households while saving about 96,600 tonnes of carbon dioxide annually.

Kelantan has also announced that a 49 MW Pasir Mas Floating Solar PV Park is on the cards, earmarked to begin commercial operations in 2024.

MELAKA

In April 2022, Shizen Malaysia Sdn. Bhd. announced that it is teaming up with Nusa Baiduri Consortium to build a 150 MW floating solar power plant at the Durian Tunggal Dam in Melaka. The FPV will be constructed in two phases, said a Shizen statement. It will sell power to the local utility Syarikat Air Melaka Bhd. (SAMB).

SELANGOR

In 2019, a company specialising in solar PV, Solarvest, installed the first floating solar facility in the country, with 432 solar panels floated at the Sg Labu Water Treatment Plant in Silak Tinggi Reservoir, Selangor. The pioneering effort was enough to power 20 houses annually.

Solarvest went bigger the following year, when it commissioned the Selangor Floating Solar PV Park on a 53-hectare site at a disused tin mining lake in Dengkil. Commissioned in October 2020, this facility can generate 16,640 MWh electricity to power 5,800 households, offsetting 11,548 tonnes of carbon emissions annually.

Solarvest is selling its renewable energy to TNB based on a Power Purchase Agreement for a period of 21 years.

Solarvest Group CEO said that this project is the company's first FPV venture and it is an LSS 2 project. Solarvest has other land-based projects under the Energy Commission's LSS programme.

SARAWAK

In July 2022, State utility company Sarawak Energy Berhad (SEB) announced the appointment of China's Trina Solar Co. Ltd. to build a 50 MW floating solar plant on the 191-hectare surface of Batang Air hydroelectric reservoir. The FPV is scheduled for commissioning in 2023. "This will further decarbonise the State's power grid," said SEB Group Chief Executive.

IN SEARCH OF TALENT

IN THE NEW ENERGY WORLD

According to the International Renewable Energy Agency (IRENA), approximately 13.7 million people around the world were employed by the renewable energy sector in 2022. This represents an increase of one million jobs from 2021, growing nearly 9% in a span of one year.

As nations accelerate their journey to become low carbon or carbon neutral societies, attracting the right talent to facilitate this has become urgent. Energy Malaysia takes a look at shifts in the energy workforce profile that is needed to drive Malaysia's decarbonisation agenda.

While the energy sector is facing a myriad of challenges such as climate change issues and the pressure for clean energy and energy efficiency, it is not the only sector being thus confronted.

Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali
Joint Chairman (Industry) of the Malaysian Industry-Government Group for High Technology (MIGHT).

Addressing the matter, Tan Sri Datuk Dr. Ir. Ahmad Tajuddin Ali, Joint Chairman (Industry) of the Malaysian Industry-Government Group for High Technology (MIGHT) points out, "Given the critical and pervasive nature of the energy sector, particularly in the electricity supply industry, the demands on (and for) talent to manage these challenges will continue to remain a national priority."

However, there appear to be more pressing concerns for now. According to Tan Sri Tajuddin, "We are still recovering from the devastating COVID-19 pandemic and aftershocks such as fuel shortages and rising prices, made worse by the Ukraine war. Globally, people are hurting from soaring costs across almost all sectors, from food to healthcare. When it comes to electricity, which is the economic and social backbone of nations, the concern now is to ensure consumers can afford to pay their electricity bills while maintaining the financial stability of power producers."

Still, the post pandemic recovery should not be allowed to foreshadow the Malaysia's decarbonisation journey, especially since the 2021 announcement to become a nation with net zero carbon emissions as early as 2050.

The International Energy Agency (IEA) Report "World Energy Employment" (August 2022) weighs in with: "The current energy crisis brought on by Russia's invasion of Ukraine is prompting countries and companies to accelerate their clean energy transitions and urgently shift and secure their energy supply chains. The success of these efforts will rest on the shoulders of the 65 million workers currently employed in the energy sector and the ability of the energy sector to attract and train new workers. As presented in the IEA's Global Roadmap to Net Zero Emissions by 2050, realising this pivot requires many more workers than today, and while some jobs will be lost, many more will be created. The new jobs will not always be in the places where jobs are lost, but they may suit workers and skill sets from industries that are downsizing."

"There is a big shift happening in the profile of our energy workforce," says Tan Sri Tajuddin. "We need talent that goes beyond the traditional sphere of mechanical and electrical engineers running power stations, for instance. With the pivot to renewable energy and energy efficiency driven by technology, the more contemporary side of engineering is becoming necessary.

"We need people who are conversant with solar photovoltaic technology, for example, and with the systems related to distributed power generation," he adds. "Additionally, consumers are becoming energy producers in their own right, especially with various Government incentives. This calls for different facilities and various technical, technological and management competencies."

He cites the example of the Net Energy Metering (NEM) scheme. "The Government is promoting NEM to enhance the uptake of solar energy by creating a community of prosumers, who can generate this clean energy by installing rooftop PV systems. They can use the energy for their own consumption and sell any excess to the utility company.

"As empowering as this is, it also means that we need to ensure that the spirit and content of this initiative is well understood and implemented across the various touchpoints. The workforce at every stage must have the appropriate competencies, which covers the broad spectrum from policy and regulations to equipment manufacture, technology applications, marketing and sales to deliver the desired results.

"We need people who are familiar with the technology used to implement NEM as well as soft skills for planning, operationalising, managing and troubleshooting, when needed," says Tan Sri Tajuddin. "In tandem, power system engineers must have the know-how to ensure that all NEM systems are stable, and everything runs like clockwork.

"Besides solar energy, biomass and mini-hydro are other high growth areas. We must educate, train, retrain and / or upskill the energy workforce to deal with this tide of change that is already upon us."

"Asia is home to energy's largest and fastest-growing workforce, driven by rapidly expanding energy infrastructure and a significant share of global clean energy manufacturing capacity." - International Energy Agency

Brain Drain

The renewable energy and energy efficient environment is flush with new job opportunities as well as job losses. Fossil fuel related competencies, particularly those related to coal are likely to decline, especially since the Government has declared that no more coal plants are to be commissioned in the future in Malaysia as part of its energy transition goals. Aging coal plants are to be phased out, with no new ones coming onstream. Those employed in this business will need to be retrained and redeployed elsewhere.

This landscape is made more complex by rapid digitalisation, decentralisation and market liberalisation. As it stands, power generation has been liberalised, while distribution is being progressively opened up. Even though national public utility company Tenaga Nasional Berhad (TNB) remains in charge of the national grid, it is investing heavily on a smart grid infrastructure that will be highly automated and digitally enabled and calls for different types of skills to build, commission, maintain and serve consumers well.

The workforce in the electricity supply industry need to face these realities and be prepared to adapt to these changes and have the versatility to move from sector to sector with relative ease. "I call to this as the internal brain drain," says Tan Sri Tajuddin. Citing himself as an example of the internal brain drain, he recalls how he was trained as a nuclear engineer and was initially employed at the Tun Ismail Atomic Research Centre (PUSPATI), the country's first nuclear reactor, which he commissioned but left soon after.

"As the industry evolved, I was "drained away", from nuclear engineering to other sectors," he said. "I went to SIRIM, to lead a technical organisation dealing with standards, followed by stints in organisations such as TNB and property developers UEM and Sime Darby. Today, I am back in the energy industry, as Independent Non-Executive Chairman of Malakoff Corporation Berhad, an independent power producer (IPP)."

The point Tan Sri Tajuddin is making is that despite his training, he has worked in various kinds of engineering and management environments. Adaptability to new ways has become conditional for workers to survive the future.

Overall, there has been a net decrease in the industry's talent pool. Senior engineers with years of hands-on industry experience are overwhelmed by the new dynamic, especially with the technology leaps. While traditional engineering courses offered by universities gave them a strong foundation, they are being derailed by the new work demands. As such, they tend to be more reactive than proactive in problem solving. This results in short-term fixes that cannot be sustained over the long term.

What is also becoming evident is that while the overall education system is aligned to meet market demands, universities are not producing exactly what the market needs. By the time the undergraduate enters the job market, what he or she learned has become redundant.

Non-Stop Learning

Universities are not the only learning environment for the workforce. Tan Sri Tajuddin says, "Universities should not delve in specialisation from the start. A broad-based curriculum is needed first. Specialisation can come later, usually in the workplace where there is on the job training. Most companies have internal and external trainers to design programmes that are specific to the company's needs." He recalls SIRIM designing courses for various types of technical competencies as well as courses on leadership, management and soft skills such as communication and Information and Communication Technology (ICT). Many big corporations have training calendars that require staff to attend a mandatory number of training hours annually.

"SIRIM also trains auditors to be familiar with quality control processes in other countries, so that they know what to look for when auditing imports, including electrical and electronic goods. For example, there are engineers specially trained to audit fire doors. They check for quality and safety and can differentiate between original and fake goods."

Citing another example, Tan Sri Tajuddin said that there are many trained technicians who were very capable at installing solar panels. In cases like these, an engineer is in charge, but it is the trained technician who does the job, becoming a highly skilled tradesman in the process. With the growth of solar rooftop installations, there is a demand for technicians and technologists in the energy sector, who have Technical and Vocational Education and Training (TVET) qualifications.

TVET is also envisaged as having the potential to address the shortage of competent, skilled and competitive electrical entrepreneurs in the field of renewable energy. Based on the literature on energy entrepreneur development, it was found that the TVET electrical entrepreneur faces four challenges, namely financial and technology costs, logistics and Government support. The proposed future development of renewable energy is in mini-hydro and solar photovoltaic (PV), while wind power does not seem viable to TVET electricity entrepreneurs.

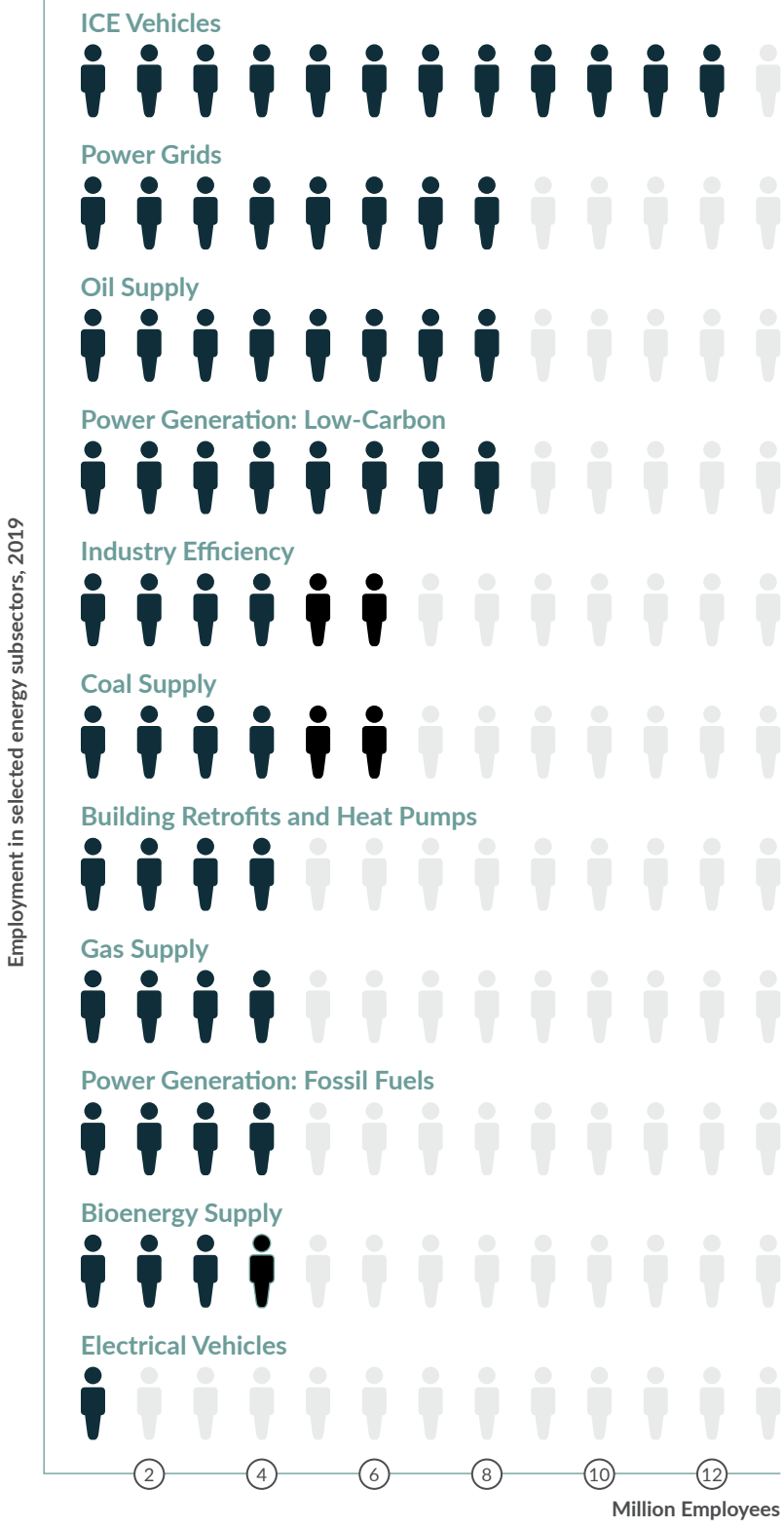
A well-structured workforce framework that identifies current and future talent needs across the energy spectrum is key. In so doing, policymakers have to future forward the sector to come up with a game plan that avoids job gluts and shortfalls that end up with an oversupply of some talents while there is a crying need in another area!

"Adaptability to new ways has become conditional for workers to survive the future."

GLOBAL TRENDS

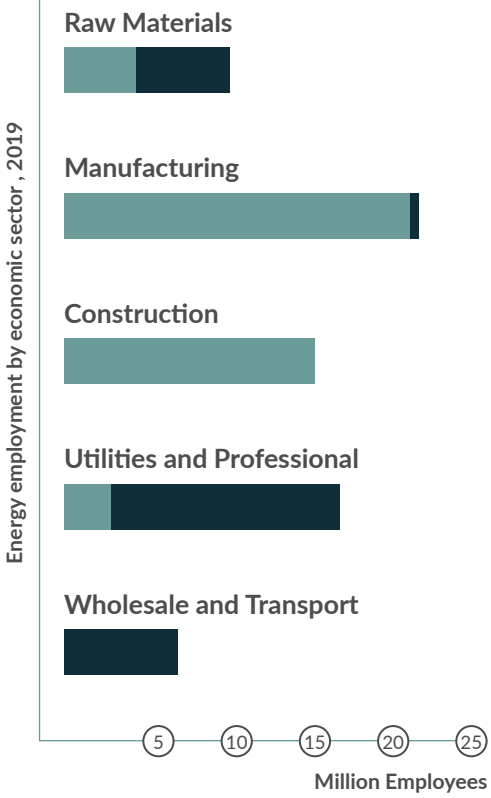
Source: https://www.iea.org/reports/world-energy-employment

Employment in new sectors already rivals levels in conventional energy sectors.



Note: ICE vehicles are Internal Combustion Engine vehicles. Power grids includes transmission, distribution and storage. Low-carbon power generation includes nuclear and renewables. Electrical vehicles includes the manufacturing of batteries.

New energy projects are the major driver of employment, with around 65% of energy workers employed to build and deploy new solar plants, wellheads, heat pumps, cars, and more.



Note: Jobs labelled "Building new projects" include the construction of new power plants, building new well heads in existing or new oil and gas fields, manufacturing upstream components for these new projects (including IT systems and software), implementing new energy efficiency retrofits in building or upgrades to industrial processes, manufacturing new vehicles, and others. "Operating existing assets" includes jobs in operations and maintenance administration at energy firms, energy traders, transport and shipping of fuel, and in wholesale trade. These jobs are commonly at electricity and gas utilities, power plants, refineries and other fuel processing facilities, at trading decks and offices and ports, etc.

Pressures of ESG

"Although renewable energy is part of their business strategy, energy companies face mounting pressure to meet their Environmental, Social and Governance (ESG) obligations. Generally, energy producers are perceived as falling short of their social obligations to safeguard communities and the environment," says Tan Sri Tajuddin. "This scenario calls for better governance by energy planners, energy auditors, stakeholder management professionals, green bankers, accountants and analysts, among others."

For the time being, energy planners are hard pressed to find the fine balance between energy security, ESG mandatories and public perception – all of which need to be managed simultaneously. They also have to take account of fuel and other operational costs and the relentless need to ensure that feedstock levels are continuously maintained despite resource constraints.

"With rapid digitalisation, there is a demand for specialist skills. An example of this is cybersecurity professionals to combat rising online crime in energy networks and expertise in artificial intelligence (AI) and Internet of Things (IoT), and related technologies."

The ESG lobby has found an ally in financial institutions, especially the big names who are now withdrawing support for businesses deemed to be non-ESG compliant. They are pushing for green growth that covers all aspects of their business, including power consumption. Tan Sri Tajuddin says, "Some insurance firms are not underwriting the shipping of coal." The societal message is clear: reduce the impact of environmental degradation or you will find doors closing. The situation is exacerbated by the need to secure fuel supplies against steadily rising prices, supply chain disruptions and global uncertainty.

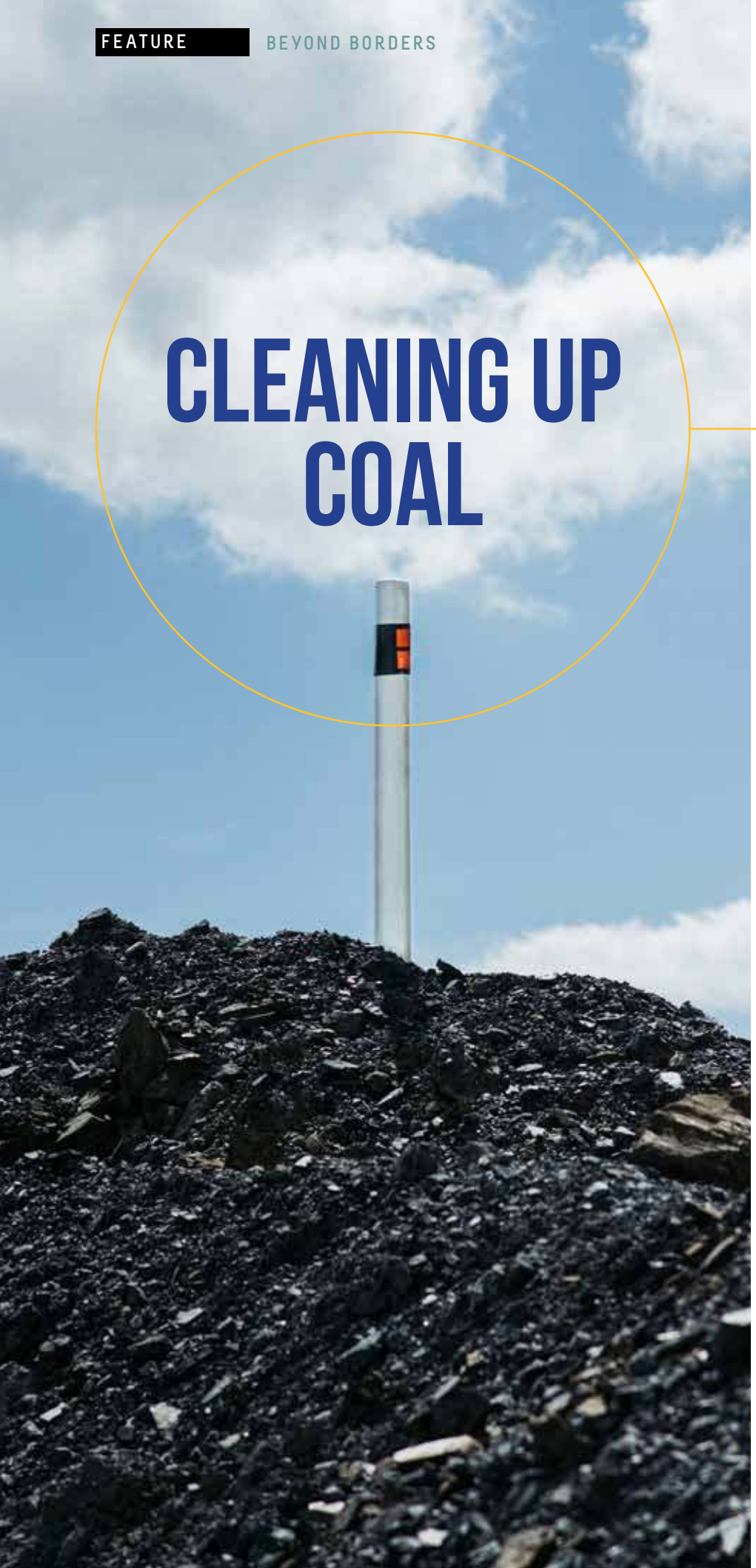
The future lies in talents that are an amalgam of many things. On one hand, they have to be technically competent, and able to learn quickly, unlearn and relearn in a short timeframe. On the other, they need to have a finger on the pulse of the industry, and the aptitude to anticipate trends and make the right moves. Tech savviness is a given, and with increased digitalisation, a career in the energy sector will be one of continuous upskilling, mental agility and professional flexibility.

Sector Specific Jobs

With rapid digitalisation, there is a demand for specialist skills. An example of this is cybersecurity professionals to combat rising online crime in energy networks and expertise in artificial intelligence (AI) and Internet of Things (IoT) and related technologies.

Unsurprisingly, many engineers gravitate towards these fields. Tan Sri Tajuddin says, "Cybersecurity and AI build on the basics of engineering while applying high levels of technology. This is particularly appealing to engineers because of their extensive training in design and detail. For many of them, building apps is a snap, and it allows them to diversify into other fields, moving seamlessly into another sector due to overlapping demands."

In the final analysis, two things will drive the energy sector forward. One, traditional training will continue to remain the bedrock upon which new job scopes will be created. Two, innovation and flexibility are fundamentals. The future of the energy workforce lies in their ability to identify their learning gaps and make good of them; being agile and flexible; and recognising that jobs-for-life is a 20th century construct.



CLEANING UP COAL

Coal is the world's cheapest, most abundant and widely distributed fuel. It is also the dirtiest fuel around. Despite growing calls to phase down or transition away from coal, it accounts for over one-third of total electricity generation, compared with 23% for natural gas. Globally, about 2,000 GW electrical (GWe) of coal-fired generation capacity is operating and expected to increase by another 500 GWe by 2030.

To counter arguments against coal-fired power plants, resources are being channelled to develop clean coal technologies for power generation. Energy Malaysia looks at the progress made thus far.

Burning coal produces over 15 billion tonnes of carbon dioxide that is released into the atmosphere, most of this coming from power generation. The development of clean coal technologies attempts to mitigate this problem so that the world's huge resources of coal can be utilised for future generations.

The challenge, however, lies in commercialising these technologies so that coal continues to remain economically viable despite the costs incurred to achieve low to near-zero emissions. Thus far, clean coal technologies have proven to be very costly and energy-intensive.

Clean coal technologies, in combination with carbon capture, utilisation and storage (CCUS), have the potential to greatly reduce the world's carbon footprint and accomplish much needed climate goals. While helping to make the future more sustainable, they are set to dramatically increase power generation efficiency at the same time.

An up-and-coming technology is Integrated Gasification Combined Cycle (IGCC) that converts burning coal into a pressurised gas, which can be burned to produce electricity. IGCC essentially cleans coal via gasification and uses carbon capture and storage (CCS) to ensure that emissions are not released into the atmosphere.

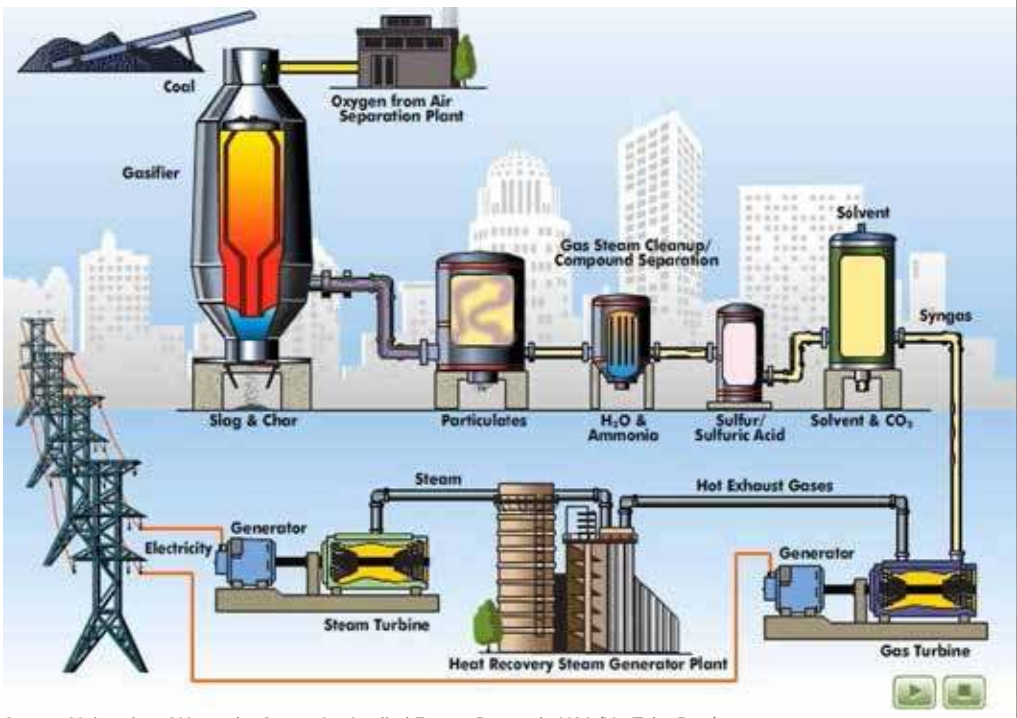
The Intergovernmental Panel on Climate Change believes that clean coal technology plants that are not already equipped with IGCC technology should at least be using CCS, in efforts to reduce the impact of coal and clean up conventional fossil fuel burning in industrial plants.

IGCC consists of two different technologies, namely, coal gasification and combined-cycle. The energy efficiency of an IGCC plant is much higher than a conventional power plant, with estimates showing that a conventional plant will emit more sulphur dioxide and nitrogen oxide in a week than what a gasification plant would produce annually. Sulphur dioxide and nitrogen oxide are pollutants produced from burning coal and gas and cause smog and acid rain, the latter when combined with rainwater.

According to the U.S. Department of Energy, IGCC power plants have the potential to reach a fuel efficiency of 50%. They are gaining momentum as next-generation thermal power systems with significantly enhanced power generation efficiency and environmental performance with their dual fuel systems, that is, coal gasification and combined cycle.

Coal gasification is a clean coal technology has been around since the 1980s, and is a thermochemical process whereby steam and oxygen are used to convert the coal into a synthesis of hydrogen and carbon monoxide, known as syngas. The cleaned gas from the gasification process is then supplied to a gas turbine combined cycle, which burns the syngas as a fuel to power the gas turbine for power generation. Essentially a by-product of coal, syngas emits far lower carbon emissions than conventional coal burning.

INTEGRATED GASIFICATION COMBINED CYCLE (IGCC)



Source: University of Kentucky Center for Applied Energy Research, USA (YouTube Post)

Clean Coal Technologies: What's the Progress?

As many coal-fired plants age and are due for decommissioning or retirement, replacing them gives rise to the wider promise for cleaner ways to produce electricity. In Malaysia, the Government has announced that aging coal-fired plants will not be replaced as part of its 2050 net zero carbon emissions ambition. But in many parts of the world, including some Organisation for Economic Cooperation and Development (OECD) countries, the big hope is that clean coal technologies can leverage on their carbon capture attributes and contribute towards the world's climate action goals.

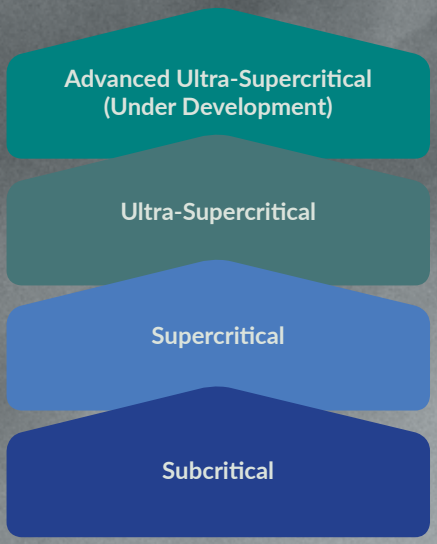
The term "clean coal" is also being increasingly used for supercritical and ultra-supercritical coal-fired plants without CCS, running at close to 50% thermal efficiency. These are also known as high-efficiency low-emission (HELE) plants. The cost to develop an ultra-supercritical (USC) plant is 20% to 30% higher than the more common subcritical plant, but its higher efficiency reduces emissions and fuel costs by 75% compared to subcritical plants. In Japan and South Korea, about 70% of coal-fired power comes from supercritical and USC plants.

USC technologies are primarily about efficiency-related emission reductions. To be on track with the Net Zero by 2050 scenario, the International Energy Agency (IEA) recommends the deployment of CCUS technology.

CCUS technology, however, remains fairly low profile. The IEA notes that CCUS facilities, for example, have been operating for decades in certain industries, but they are still a work in progress in areas that need this technology the most. It adds, "CCUS can be retrofitted into existing power and industrial plants that could otherwise emit 600 billion tonnes of carbon dioxide over the next five decades."

"CCUS can be retrofitted into existing power and industrial plants that could otherwise emit 600 billion tonnes of carbon dioxide over the next five decades."

Evolution of Coal Fired Power Plant Technology

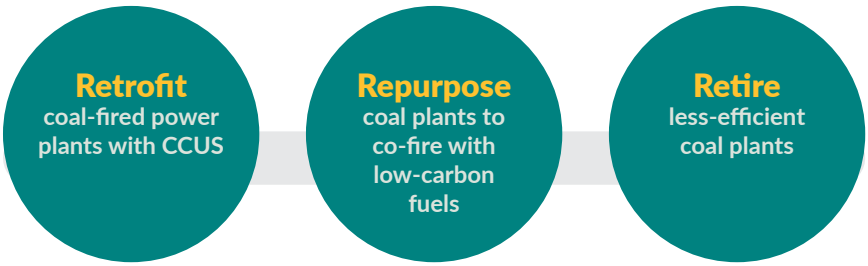


There are three main types of coal-fired power stations in increasing order of efficiency. They are subcritical, supercritical, ultra-supercritical (USC). Subcritical plants are the least efficient, although recent innovations have allowed retrofits to older subcritical plants to meet or even exceed the efficiency of supercritical plants.

General Electric (GE), a leader on coal power plant technologies, explains on its website: "The most efficient USC technology in the world today can help plants deliver up to 47.5% net efficiency rates, significantly higher than the global average of 34%. Each percentage point improvement in efficiency significantly reduces carbon dioxide emissions from coal power plants by over two percentage points, resulting in 26% less carbon dioxide per MW than the average coal plant. With advanced emission controls equipment that can remove local pollutants such as nitrogen oxide, sulphur dioxide and particulate matter, USC coal power plants can deliver more power with a lower environmental impact."

Advanced ultra-supercritical power plants are the future, and target to further improve efficiency and emissions.

Efforts to address emissions from the existing coal-fired power plant fleet, including those from the large, young fleet in emerging markets and developing economies, are essential for reaching net zero goals. Governments and industries should consider a three-pronged approach in order to stay on track with the phase-out of unabated coal plants by 2040. They are:



Source: International Energy Agency

Southeast Asia and Clean Coal

With population growth and rapid urbanisation, the demand for energy in Southeast Asia is expected to increase by 60% in 2040, according to the IEA, driven mainly by electricity consumption. Coal will contribute to 40% of this growth, to serve the region's demand for 565 GW of electricity by 2040.

The ASEAN Forum on Coal (AFOC) has been established as a platform for regional cooperation for sustainable coal development. Chaired by the Chief Executive Officer of the Energy Commission, AFOC in collaboration with the ASEAN Center for Energy (ACE) organises and conducts various programmes that include the promotion of clean coal technology.

In the ASEAN Clean Coal Technology Handbook for Power Plants by the ASEAN Centre for Energy, member countries have acknowledged that in order to ensure the continued use of coal in the region, clean coal technologies must be implemented to curb the release of harmful carbon dioxide, sulphur dioxide and nitrogen oxides into the atmosphere. The handbook also mentions how clean coal technologies have been slow to materialise in ASEAN.

However, current trends do show that the region is moving towards HELE technology – where supercritical and ultra-supercritical projects are already operational or being built.

Energy economist, Han Phoumin, contends that despite ultra-supercritical technology being one of the best options for reducing emissions, the high investment costs have deterred some developing countries in Asia. Ultra-supercritical coal plants like Malaysia's Manjung 4 and Manjung 5 were developed at a cost of around USD$1.4 billion each.

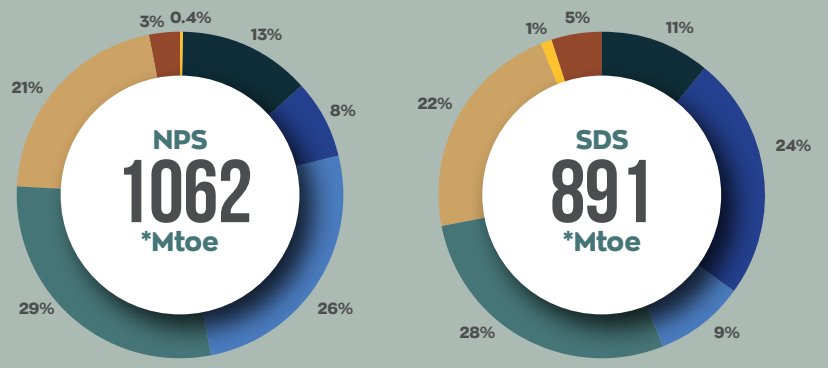
According to Han Phoumin, lowering these upfront costs is necessary and can be done through policy frameworks such as attractive financial schemes and through strong public institutions that can provide public financing for clean coal technologies to be more widely implemented in Southeast Asia.

"AFOC, which is chaired by the Chief Executive Officer of the Energy Commission, in collaboration with ACE organises and conducts various programmes that include the promotion of clean coal technology."

The Southeast Asia Energy Outlook presents a multi-scenario analysis of the efficiency of the energy mix utilised in Southeast Asia. Apart from the New Policies Scenario (NPS), an alternative path is presented in the Sustainable Development Scenario (SDS).

Percentage of electricity generation from coal by 2040, overtaking gas as the primary fuel.

50%



The New Policies Scenario (NPS) reflects today's configuration of enacted and announced energy policies. The energy mix consists of more high-carbon sources.

*Mtoe means million tonnes of oil equivalent (a lower value means better efficiency)
Source: Southeast Asia Energy Outlook (2017)

Malaysia's Clean Coal Journey

Malaysia took the clean coal technology route in 2015, through the Manjung Power Station.

Also known as the Sultan Azlan Shah Power Station, this is a 4.1 GW coal-fired facility located on an artificial island off the coast of Perak, Malaysia. It comprises five generating units along with terminal and coal handling facilities. The first three 700 MW units of the plant are equipped with conventional boilers, steam turbines and generators.

As the country pushed ahead with its climate change agenda, the 1,000 MW Manjung 4 plant was commissioned in 2015, and became Southeast Asia's first ultra-supercritical coal-fired power plant.

Equipped with advanced environmental control technologies, including flue gas desulphurisation systems, the plant emits 70% less sulphur dioxide and nitrogen oxide than a conventional coal plant.

Two years later, Manjung 5 was commissioned in 2017, and became the second 1,000 MW ultra-supercritical plant operating at the Manjung Power Station Complex.

Originally developed with three 700 MW units, the Manjung Complex began operations in 2004. Built in three phases from 1999 through to 2017, the power station, owned by Tenaga Nasional Berhad (TNB), is one of the largest independent power producer (IPP) projects in Asia.

MALAYSIA'S MANJUNG POWER STATION COMPLEX

2004
MANJUNG 1, 2 ,3
700 MW (x3)

2015
MANJUNG 4
1,000 MW
FIRST
Ultra-Supercritical Plant in South East Asia.

Manjung 4 Power Plant

Manjung 5 Power Plant

2017
MANJUNG 5
1,000 MW

WHY COAL?

Coal-powered electricity reached an all-time high in 2021, said a World Economic Forum Annual General Meeting post (3 May 2022). At the COP26 conference in 2021, 40 nations including Malaysia had agreed to phase out coal from their energy mixes. But by then, coal-fired electricity generation had reached an all-time high globally, showing that eliminating coal from the energy mix will not be a simple task.

According to an IEA report, coal-fired power generation increased by 8% in 2021, reversing the declining trend over the past two years. Coal served more than half of the additional power demand in 2021, growing faster in absolute terms than renewable energy for the first time since 2013.

Bloomberg New Energy Finance (NEF) analysts say three factors contributed to the surge, namely, rebounding top-line electricity demand thanks to economic recovery, lower hydro generation due to droughts around the world, and higher natural gas prices.

Opposing Trends

There is a strong case for coal in power generation in many countries In addition to being a cheaper source of electricity, coal limits their dependence on oil and gas producing countries and hydrocarbon price volatility on their economies.

"What is being observed is opposing trends in the world's largest economies. Efforts and announcements by countries that are phasing out the use of coal to produce electricity are being counteracted by a number of countries that are increasing the share of coal in their power mix," notes Carine Sebi, Assistant Professor of Economics, Grenoble École de Management, in "The Conversation" (24 February 2019).

"This is the case particularly for major coal-producing countries such as Indonesia, Turkey and India. Other countries seeking to diversify their energy mix are increasingly using coal to produce their electricity such as Chile, South Korea and Japan. Due to a lack of domestic fossil fuel resources, Japan is one of the largest oil, natural gas and coal importing countries. The share of coal in Japanese electricity production increased significantly to cope with the closure of nuclear power plants following the Fukushima disaster," she adds.

Meanwhile, some countries with coal reserves such as the Philippines and Vietnam are developing this resource to produce electricity and to improve their energy independence and balance of payments.

On the other end of the spectrum, the share of coal in the electricity mix has fallen sharply in most European Union (EU) countries, as well as in China and the U.S. EU countries are significantly reducing the use of coal. China, by far the world's largest coal consumer for electricity generation, is implementing restrictive environmental and energy policies on coal use to improve air quality and to contribute to efforts to fight climate change. The U.S. is a major coal-producing country, which has significantly reduced the importance of coal in its electricity mix, although a reason sometimes cited for this pull back is the development and abundance of shale gas found in the country.

In the meantime, several under developed and emerging economies in Asia, Africa, and Central America have jumped onto the coal power generation bandwagon despite calls to fight climate change.

The Challenge

Carine Sebi says, "The primary challenge comes from countries that are both large producers and consumers, such as China and India, which are trying to reduce their dependence on coal. The question remains whether these efforts will be sufficient, particularly in view of the enthusiasm for coal (abundant, easy to transport and cheap) in countries currently introducing coal power generation like Bangladesh, or in view of the implementation of plans promoting the development of this fossil fuel in countries with substantial coal reserves."

With electrification steadily increasing, driven by the development of some emerging economies and the diffusion of new electric end uses, such as electric cars (e-mobility), electricity demand will continue to rise in the short and medium term, with coal appearing as the more cost-effective fuel option.

THE SWITCHOVER FROM ANALOGUE TO DIGITAL TECHNOLOGIES

Hello Analogue...

Since electricity became a public utility, it has fired the creative impulse and imagination of inventors to come up with a bewildering array of products and machines that have transformed the way we live, work and play. One of the biggest breakthroughs came in the form of analogue technology that took the world by storm sometime in the late 19th century, with the voice recordings made by Thomas Edison.

It heralded a brand-new age of communication and entertainment, which unfolded with a parade of modern conveniences based on analogue technology, such as audio record players, cathode ray tube (CRT) television sets and monitors, video cassette recorder (VCR) players and tapes, polaroid and film cameras, laser photocopiers and computers. Computers made their appearance on analogue technology, as did various other industrial and commercial operations such as electricity transmission and distribution systems.

In households, analogue meters were used to measure electricity consumption for decades before being supplanted by smart meters in recent years.

Initially, analogue technology was associated with measuring instruments, but it progressed to represent everything that is not digital. Most digital technologies, which are being adopted in the interest of automation, process efficiency and worker productivity, have analogue origins.

Analogue VS Digital

Both analogue and digital technologies and applications can be traced to signals, electrical currents that carry data from one system or network to another. The difference lies in how the signals are encoded or encrypted.

In analogue technology, the signals are stored in the original form. For example, in an analogue tape recorder, a signal is taken straight from the microphone and laid onto tape. The wave from the microphone is an analogue wave, and therefore the wave on the tape is analogue as well. That wave on the tape can be read, amplified and sent to a speaker to produce the sound.

In digital technology, the analogue wave is sampled at some interval, and then turned into numbers that are stored in the digital device. On a compact disc, for example, the sampling rate is 44,000 samples per second. So, there are 44,000 numbers stored per second of music on the compact disc. To hear the music, the numbers are turned into a voltage wave that approximates the original wave.

The advantage of analogue technology is that the signals are easy to synchronise with smaller bandwidth. In addition, they are easy to process and allow an infinite range of values to be stored. However, a major con is that analogue signals produce unwanted noise and disturbance in the transmitted data.

With digital signals, recordings do not degrade over time, and they require even less bandwidth than analogue-transmitted signals. Additionally, since the data is stored in the form of numbers, it can be made more compact, compressible, and easy to process via Digital Signal Processors (DSP).

Digital devices are also more accurate. For example, digital watches are more accurate than their analogue counterparts because they have less variation in electronic signals. A typical digital watch has only 15 to 30 seconds variation a month, whereas an analogue one can have a variation of around 5- 20 seconds a day.

A Case for Co-Existence

Analogue technologies once dominated every sphere of life and they still have a role to play, say some electronics experts. While some products have met their D-Day, they predict that not all analogue components can be completely substituted by digital devices; more likely, they would co-exist and complement each other.

Analogue Television

In the early 1940s, television sets received programmes via analogue signals made of radio waves. Analogue signals reached television sets through three different methods: wirelessly through airwaves (terrestrial), through a cable wire (cable), or by satellite transmission.

The analogue television is regarded as the original television technology, which broadcast video and audio of varying brightness, colours and sound depending on the amplitude, phase and frequency of the analogue signal.

Picture and sound quality varied over different geographies, resulting in "snowy" images, crackling sounds and poor reception when the signal is moderately weak, especially in remote areas.

All broadcast television systems used analogue signals before the arrival of digital television, which revolutionised television viewing through its lower bandwidths, compressed digital signals and quality reception, which becomes intermittent or non-existent only when the signal drops below a threshold level.

In many countries, analogue television broadcasting is history. In Malaysia, the Malaysian Communications and Multimedia Commission (MCMC) had announced the complete switchover from analogue TV to digital TV on 31 October 2019.

Analogue Computers

Analogue computers were first built at the start of the 20th century. The early models did calculations by means of rotating shafts and gears. Numerical approximations of equations that are too difficult to solve in any other way were also evaluated with such machines. In time, they grew in complexity.

Slide rules and nomograms were the simplest form of analogue computers, while naval gunfire control computers and large hybrid digital / analogue computers were among the most complicated. Complex mechanisms for process control and protective relays used analogue computations to perform control and protective functions.

Analogue computers were used widely in scientific and industrial applications even after the advent of digital computers, because at that point in time they were typically much faster. But they started to become obsolete as early as the 1960s.

However, they continue to remain in use for some specific applications such as aircraft flight simulators, flight computers and teaching control systems in universities.

Perhaps the most relatable example of analogue computers are mechanical watches where the continuous and periodic rotation of interlinked gears drives the seconds, minutes and hours needles in the clock.

More complex applications such as aircraft flight simulators and synthetic-aperture radar (SAR) that are used for environmental monitoring, earth-resource mapping, and military systems have remained the domain of analogue computing (and hybrid computing) well into the 1980s, since digital computers then were insufficient for the task.

Power Management

In Malaysia, power management is rapidly moving into the "smart" digital space, with heavy investments being made in the smart grid and various other applications as the country makes the energy transition into renewables and accelerates its energy efficiency and energy intensity goals.

Online magazine, EE Times, noted that not all power management functions are best implemented entirely in digital or analogue. Each has inherent benefits and drawbacks.

Thus, a correctly partitioned system can lead to the best available solution for today's circumstances. For example, it cites Pulse Width Modulation (PWM) circuits that are probably better in the analogue domain, while the communication block that includes data can be digitalised.

COMMON ANALOGUE PRODUCTS


Photocopiers


Fax machines


Land-line telephones


Volume control radios


Audio tapes


Music synthesisers


Televisions and VCRs


Home appliances


Multimetres


Clocks and watches

Welcome to the Smart World

The “Smart Home” or “Smart Living” is here to stay, having overtaken many analogue technologies with its adaptability, accuracy and responsiveness. Riding on internet connectivity, it has opened new possibilities driven by the Internet of Things (IoT), which connects people, devices and technology. It is being readily embraced by people keen to live more productively while being meaningfully connected with family, friends and the workplace, despite lingering reservations over issues such as personal privacy and security.

According to Fortune Business Insights, the global smart home market size, which was USD99.89 billion in 2021, is expected to grow to USD380.52 billion in 2028 - at a Compound Annual Growth Rate (CAGR) of 21.1% during this period.

This growth is due to increased accessibility to the internet, rapid embrace of technology and the love of smartphones and related gadgets by larger sections of the population. The demand for comfort, convenience and more efficient management of security, energy, resources as well as health and wellness has also fuelled the smart home market.

Smart Home Technologies

SMART, which is short for “Self-Monitoring, Analysis and Reporting Technology” goes beyond connectivity; it is designed to improve the way we interact with our environment, especially homes. Developed in 1992, it gained traction between 1998 and the early 2000s, when it was used to monitor and report on the status of objects at home, for example whether the lights were switched on or off or if there is a home invasion, by using advanced technologies such as IoT, AI (Artificial Intelligence), machine learning and big data.

Put simply, a smart home’s amenities are fitted with communications technology, enabling some degree of either automation or remote control. A smart home is an automated home, with features such as smart lighting, home security, smart appliances, smart entertainment and the like.

The smart home’s connectivity and monitoring-control features empower those working away from home or travelling regularly – they can monitor the goings-on at home through their connected devices, namely, smartphones and computers. This means they can monitor power usage as well as the safety of their children and the elderly at home without being there physically.

SMART HOME ESSENTIALS


Smart bulbs


Smart meter


Smart computer


Smart mobile phone


Smart home entertainment


Smart security system


Smart vehicle navigation system


Smoke detector


Closed circuit television (CCTV) camera

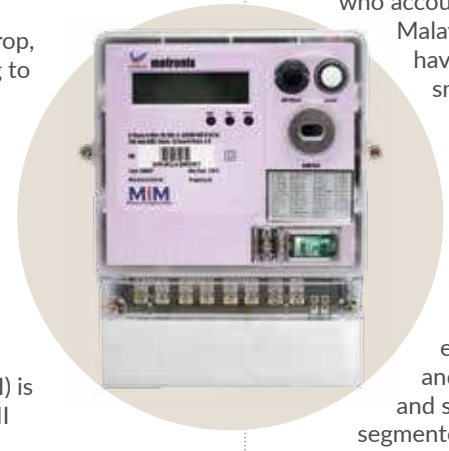
The IoT platform is one of the most significant global economic drivers for the growth of the smart home market. According to Global System for Mobile Communications Association (GSMA) Intelligence, IoT connections are expected to reach approximately 25 billion globally by 2025, up from 10.3 billion in 2018.

Due to this, we can expect to see massive clusters of sensors, devices and things that communicate through high-speed technology such as 5G. The prospect of a proliferation of IoT devices is already incentivising some global companies to ramp up efforts in the development of IoT platforms and related technologies to seize opportunities in the growing smart home goods market.

Another trend is home automation. According to Investopedia, globally there are an estimated 175 million smart homes who are now combining AI and automation. This has seen a rollout of innovative security devices. Smart homes are now installing video door alarms, facial recognition devices, ultra-modern burglar alarms and remote-controlled locks to prevent home invasions, among other gadgets.

Electricity Supply: Malaysia Gets Smart

Globally, the world is in the midst of an energy transition, away from fossil fuels and into sustainable renewables and reducing carbon emissions.



Against this backdrop, Malaysia is seeking to create new energy experiences that would pave the way for a smarter, greener Malaysia. National utility provider Tenaga Nasional Berhad's (TNB's) Advance Metering Infrastructure (AMI) is a case in point. AMI kicked off with the installation of smart meters in homes to enable domestic consumers to manage their power consumption better. The target is for 9.1 million smart meters to be installed in households across Peninsular Malaysia by 2026. As at March 2023, almost 3 million smart meters had been installed.

With smart meters, consumers can track their power usage and patterns. Homes can leverage on the smart meter technology to monitor their daily electrical usage and take steps to reduce consumption and avoid wastage. Industrial and commercial customers, who account for about half of Malaysia's power usage, have already installed smart meters in their premises.

TNB has also embarked on the smart grid infrastructure and digitalisation to facilitate more efficient operations and improve distribution and supply to a more segmented customer base. Smart technologies are also being embedded into city and community management systems, with sustainable energy as a key consideration in the national Smart Cities and Smart Communities programme.

Despite market opportunities for smart homes, the rate of adoption, especially in the developing countries in Asia, is still low compared to that in European and American markets. But as technology evolves and living standards rise, it is envisaged that there will be a corresponding growth in demand for smart homes.

Having said that, it would also require both the public sector and private industry players to collaborate and drive the country's digital transformation agenda forward.

GOVERNMENT INCENTIVES FOR SMART PRODUCTS

INCENTIVE 1
MANUFACTURERS

- Pioneer Status or Investment Tax Allowance under Section 112 or 113 Income Tax Act 1967 to produce Industrialised Building Systems (IBS) components.
- The IBS project must be certified by Construction Industry Development Board (CIDB) to enjoy this incentive.

1

INCENTIVE 2
CONTRACTORS

- Full exemption of the 12.5% levy imposed by CIDB for housing projects with an IBS score of more than 50.

2

INCENTIVE 3
MANUFACTURERS

- Automation Capital Allowance (Automation CA) announced in 2015 to further encourage manufacturing companies to engage in innovative and productive activities as well as the quick adoption of automation, especially for industries that are heavily reliant on foreign labour.
- Smart Homes can be considered under Category 2 whereby an Automation CA of 200% will be provided on the first RM2 million expenditure incurred within five years of assessment from 2015 to 2020.

3

INCENTIVE 4
MANUFACTURERS

Incentives for electrical and electronic products and components manufacturers related to smart homes technology:

- Information and communication technology (ICT) products, systems or devices.
- Digital entertainment or infotainment products
- Electronic tracking or security systems or device
- Alternative energy equipment, products, systems, devices or components
- Energy saving lighting

4

Industry4WRD

GOVERNMENT INITIATIVES & INCENTIVES

Back in 2018, the Malaysian Government launched the National Policy on Industry 4.0 (Industry4WRD) to drive the digital transformation of the manufacturing and services sector. It is envisaged that this will have a multiplier effect in accelerating the adoption of not just smart home technologies but also smart cities and smart services, among others.

Towards this end, the Government initiated the Industrialised Building Systems (IBS) that is to be complied by contractors beginning 2020. IBS will enable contractors and their customers to monitor the construction of buildings remotely, to reduce wastage and increase efficiency on all fronts. At the second Smart Cities and Smart Manufacturing Convention held in 2019, delegates from various Ministries, Agencies, industry leaders, investors and academics from Malaysia and overseas gathered, to deliberate on how the country can advance on the technological wave.

The Malaysian Investment Development Authority (MIDA) website says that the Government anticipates that by 2025, Malaysia will be one of the primary destinations for high-tech industries and rank among the top nations in the Global Innovation Index.

Meanwhile, ResearchAndMarkets.com says that the Malaysian smart home market is expected to exceed USD235 million by 2025. Indeed, there is a growing demand in the Malaysian market for a safe and secure home environment. Smart homes that are equipped with information and computing technology devices, can respond to and meet these requirements of house owners in an effective and efficient manner.

Meanwhile, the Government had also introduced various incentives for smart products for manufacturers and building contractors as it advances towards becoming a digital economy.

EVENTS AND ACTIVITIES
IN AND AROUND ST

CORPORATE GREEN POWER PROGRAMME

On 7 November 2022,the Energy Commission launched the Corporate Green Power Programme (CGPP) to facilitate the implementation of Virtual Power Purchase Agreements (VPPA) by corporate companies in Malaysia. CGPP consists of guidelines for the implementation of VPPA.

CGPP follows closely on the heels of the Government announcement at the International Sustainable Energy Summit (ISES) 2022 held in August that it would approve the allocation and redistribution of renewable energy resources to boost Malaysia's energy transition. At the Summit, a quota of 600 MW was offered for the procurement of green electricity supply to corporate companies through VPPAs.

The CGPP and VVPAs target the corporate sector, for them to play a pivotal role in achieving Malaysia's climate change goals.

According to the Ministry of Energy and Natural Resources, the introduction of CGPP is to help Malaysia achieve its target of having 31% renewable energy capacity by 2025 and 40% by 2035 in the total energy mix. This will enable an estimated reduction of 701,000 tonnes of carbon dioxide per year.

Currently, corporate consumption of renewable energy is mainly through solar PV rooftop installations, under the Net Energy Metering (NEM) and Self Consumption (SelCo) schemes. Another programme that is available is the Green Electricity Tariff (GET). GET subscribers will automatically receive Renewable Energy Certificates (RECs), which can be used to affirm their Economic-Social-Governance (ESG) pledges.

It is envisioned that by participating in the wide-ranging renewable energy programmes available in the country, Malaysian corporates can prepare themselves to become members of the RE100.

The RE100 is a global initiative bringing together the world's most influential businesses committed to 100% renewable electricity. Led by the Climate Group and in partnership with the Carbon Disclosure Project (CDP), a non-profit organisation that runs global disclosure systems, RE100's mission is to accelerate change towards zero carbon grids at scale.

ISES 2022: EMPOWERING ENERGY TRANSITION

On August 29-30, 2022, Malaysia hosted the fifth International Sustainable Energy Development Summit (ISES) 2022. Organised by the Sustainable Energy Development Authority (SEDA), in collaboration with the Ministry of Energy and Natural Resources, the two-day event explored the theme, "Empowering Energy Transition".

Energy experts and thought leaders shared ideas on how to accelerate sustainability by transitioning to clean energy from the technology, financing, business and Government policy perspectives.

Discussions centred around actions as well as interventions required to achieve the Malaysia's renewable energy target of 31% by 2025 and 40% by 2035 in the fuel capacity mix, as outlined in SEDA's Malaysia Renewable Energy Roadmap (MyRER).

Panellists highlighted the energy sector's pressing issues, against the backdrop of an ongoing global energy supply crisis. Other topics that were delved into included decarbonisation of the energy sector, green growth opportunities, regional interconnectivity and digital innovation of the power grid.

ISES is a response to the global call for Governments to prioritise and accelerate the energy transition agenda. Launched in 2012, the biennial ISES focuses on renewable energy and energy efficiency.

The 2022 event also examined actions taken in the context of post COVID-19 economic recovery measures. It heard 70 speakers, who covered various aspects of climate change and sustainability in Malaysia and the world. There were also more than 30 exhibitors, large-scale displays, technology demonstrations, trade and business matching sessions and pocket talks.

ISES 2022 was attended by some 4,500 visitors from around the world.

EE CHALLENGE 2022

RECORD BREAKING EE CHALLENGE 2022

ATTRACTS MORE THAN 3,000 PARTICIPANTS

The annual Energy Efficiency Challenge (EE Challenge) 2022 saw the highest number of participants on record, attracting 3,189 entries from all over Malaysia. Organised by the Energy Commission since 2014, the 2022 contest is the most successful to date in efforts to cultivate safe and efficient use of electricity among school children.

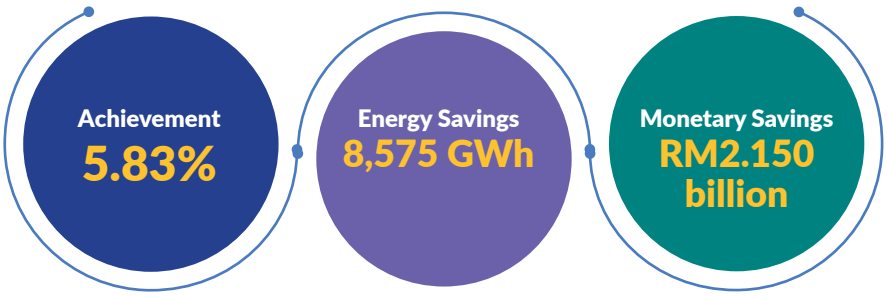
Participants had a choice of submitting online entries in five categories: #poster-drawing-challenge; #story-telling-challenge; #video-making-challenge; #promotional-advertisement-challenge; and the Model Energy Efficient Schools.

In his speech at the prize giving ceremony held on 8 December 2022 in Putrajaya, the Secretary General of the Ministry Dato' Haji Rosli Isa said, "The younger generation represents hope in the country, and with the awareness they now have about energy efficiency and safety, and with regular practice, can contribute positively to combating climate change."

He also noted that the Government had rolled out the National Energy Efficiency Action Plan (NEEAP) that targets 8% energy savings, which is an equivalent of 52,223 GWh, between 2016 and 2025 from various energy efficiency initiatives.

The Energy Commission's Chief Executive Officer, Dato' Ir. Ts. Abdul Razib Dawood said ongoing initiatives will continue promoting energy efficiency such as the EE Challenge. "It is then up to parents and teachers to lead by example, and ensure students are diligent in consciously using energy safely and prudently," he added.

ELECTRICITY SAVINGS UNDER NEEAP AS OF SEPTEMBER 2023



And here's what the winners say...

"While working on the video for EE Challenge 2022 to educate our classmates and friends on how to reduce electricity consumption and use electricity more safely, our project team also learned ways to practise energy efficiency at home. It was fun working on the video because we had to be creative so that people watching our video will be influenced to become more energy efficient."

Winner of #VIDEOMAKINGCHALLENGE
Electrical Savior X Silat Pewaris
Form 4 SMK Agama Kuala Abang
Dungun, Terengganu

"I have always liked art, so I thought why not I enter the challenge to show how important it is to save energy not only for now but for future generations. While I am pleased that I won the challenge, I want my family, friends and everyone who sees my poster to be inspired to consume less electricity and be energy efficient every day."

Winner of #POSTERDRAWINGCHALLENGE
Woo Mei Shan
Form 4-6 SMJK Ave Maria Convent
Ipoh, Perak

"My dad and I wanted a fun way to teach people on how they can save on their electricity consumption. We used the idea of air conditioners and plants talking to each other to make people understand that nature is suffering from too much wastage of electricity, causing the greenhouse effect. We used comic-style storytelling to send the message that we must save electricity and not cause pain to nature."

Winner of #STORYTELLINGCHALLENGE
Tan Zhi Ling
Standard 4 SJKC Kwang Hwa
Sungai Nibong, Penang

EE CHALLENGE 2022: WINNING ENTRIES

#POSTERDRAWINGCHALLENGE

PRIMARY 4 - 6

1 **Ata bin Abd Aziz**
Sekolah Jenis Kebangsaan Cina
Nan Yik Lee Rubber
Kuala Lumpur

2 **Tan Jay Khai**
Sekolah Jenis Kebangsaan Cina
Triang 2
Pahang

3 **Amber Chee Jin Xuan**
Sekolah Kebangsaan Cina Anglo
Chinese, Kota Kinabalu
Sabah

FORM 1 - 3

1 **Mya Syafia Nylea binti Ahmad Rodifairoz**
Sekolah Menengah Kebangsaan
Putrajaya Presint 16(1)
Putrajaya

2 **Crystal Voo Siao Jing**
Sekolah Menengah Jenis Kebangsaan
Shan Tao
Sabah

3 **Nikki Chee Jia Chi**
Sekolah Tinggi Kota Kinabalu
Sabah

FORM 4 - 6 & ABOVE

1 **Woo Mei Shan**
Sekolah Menengah Jenis Kebangsaan
Ave Maria Convent
Perak

2 **Nur Ayuni Basyirah binti Mohmad Rozye**
Sekolah Menengah Kebangsaan
Agama Al-Irshad
Pulau Pinang

3 **Sheannie Merlyn James**
Sekolah Menengah Kebangsaan
Tamparulli
Sabah

#STORYTELLINGCHALLENGE

1 **Tan Zhi Ling**
Sekolah Jenis Kebangsaan Cina
Kwang Hwa, Sungai Nibong
Pulau Piang

2 **Lina Khalesya binti Khairul Izuan**
Sekolah Integrasi Rendah Agama Jawi
Saidina Uthman Bin Affan
Kuala Lumpur

3 **Alia Faqihah binti Muhammad Faris**
Sekolah Kebangsaan Jaya Gading
Pahang

#VIDEOMAKINGCHALLENGE

1 **Electrical Savior X Silat Pewaris**
Sekolah Menengah Kebangsaan Agama Kuala Abang
Terengganu

2 **The Energy Efficiency Label**
Sekolah Menengah Kebangsaan Abdul Rahman Talib
Pahang

3 ***Lebih Cekap Tenaga, Lebih Jimat Belanja***
Maktab Rendah Sains Mara Bentong
Pahang

#PROMOTIONALADVERTISEMENTCHALLENGE

1 **Better Informed, Better Choices**
Syahmie binti Syabani
Inez Aleeya binti Zulkiflee

2 ***Lebih Banyak Bintang, Lebih Cekap Tenaga***
Nor Rosmini binti Ibrahim
Sazahly bin Osman

3 ***Bersuara Untuk Hak Anda***
Nur Farah Qistina binti Yusli
Muhammad Harith Danial bin Md Napiz

MODEL ENERGY EFFICIENT SCHOOLS

PRIMARY SCHOOLS

1 **Sekolah Kebangsaan Bukit Jawa**
Kelantan

2 **Sekolah Kebangsaan Panchor Merah**
Terengganu

3 **Sekolah Jenis Kebangsaan Cina Kwang Hwa**
Pulau Pinang

FORM 1 - 3

1 **Sekolah Menengah Kebangsaan Datuk Syed Ahmad**
Kedah

2 **Sekolah Menengah Kebangsaan Tamparuli**
Sabah

3 **Sekolah Menengah Kebangsaan Pulau Serai**
Terengganu

7TH ASEAN ENERGY INSIGHTS AND OUTLOOK REPORT

On 14 February 2023, the ASEAN Centre for Energy (ACE) held a webinar to share key insights in the 7th ASEAN Energy Insights and Outlook (AEO7) report that was launched at the 40th ASEAN Ministers on Energy Meeting (AMEM) held in Phnom Penh on 15 September 2022.

Themed 'Redesigning ASEAN Energy Security', the webinar's objectives were:

OBJECTIVE 1

To Widen Public Knowledge on the AEO7's Findings Following Its Launch.

OBJECTIVE 2

To Present Lessons Learned from ASEAN Energy Sector in 2022.

OBJECTIVE 3

To Discuss Key Insights from Experts on Policy Recommendations, Required Policies And Actions Or Redesigning ASEAN Energy Security in 2023.

Moderated by ACE Executive Director, Dr. Nuki Agya Utama, webinar speakers included Dr. Ambiyah Abdulla, Silvira Ayu Rosalia and Rika Safrina from ACE; Toru Muta from the International Energy Agency; and Dr. Kazutomo Irie from the Asia Pacific Energy Research Centre.

The webinar highlighted the future of the ASEAN energy landscape in four pathways – fossil fuels, renewable energy, energy efficiency, and electricity. The energy industry experts deliberated on the need to rethink a future scenario where energy could be made more safe, secure and reliable.

The speakers also addressed the challenges of unstable natural gas supply, the need for stronger regional collaboration for energy and called for a long-term view towards energy security design and initiatives to attract more green energy investments into ASEAN.

Report's Findings

AEO7 is the first ASEAN energy outlook report where ASEAN takes full leadership in data gathering, modelling, writing and dissemination. It was developed by ACE in collaboration with national experts from ASEAN Member States and guided by the ASEAN Regional Energy Policy and Planning Sub-sector Network (REPP-SSN).

Using historical data from 2005 to 2020, the report forecasts the ASEAN energy system until 2050. It continued with the past edition's three scenarios: the Baseline Scenario, AMS (National) Targets Scenario (ATS), and the APAEC (Regional) Targets Scenario (APS).

In addition, AEO7 introduced a new scenario that is based on optimisation. This is the Least-Cost Optimisation (LCO) Scenario, a technology-neutral optimisation applied to the power sector. It reflects on all potentially viable technologies in emerging economies, such as ASEAN. This scenario considers the cost-effectiveness, affordability, and technology maturity to fulfil the growing electricity demand. It also includes the deployment of energy storage and interconnections.

In the Baseline Scenario, ASEAN will become a net importer of natural gas and coal as soon as 2025 and 2039. It assumes no significant discoveries or additions to existing production infrastructures and with continuous fossil fuels utilisation.

In 2020, ASEAN achieved an energy intensity reduction of 23.8% amidst the pandemic. Continuing the progress with national targets, though, does not result in achieving the regional target of 32% by 2025. Similarly, renewable energy in the Total Primary Energy Supply (TPES) has a projected 5.5% gap in achieving the target by 2025.

Conversely, the installed-capacity target is on the way to reaching 37.9% by 2025, according to ATS, exceeding the target. AEO7 provides insight into ways to fill the gap. The efforts include adopting stringent energy efficiency measures, increased electrification, and renewable energy resource optimisation.

The LCO Scenario sheds light on a cost-effective alternate future, post-2025. An electricity generation system that costs USD174.7 billion less than the APS can be realised during the projection period of 2021-2050. The cost-effective system in the LCO Scenario, though, will reduce the renewable energy share in TPES by 5.3% in 2050, compared to APS. Interestingly, it results in a more energy-efficient system. The outlook projects the energy intensity reduction to be 3.5% higher than the APS by 2050.

Other Analyses

AEO7 also explores socio-economic impacts in ASEAN, including the social cost of energy, renewable job creation, and biofuel land use. Furthermore, the report elaborates on six essential energy sectors to attain a secure and reliable energy transition. The six thematic insights cover Grid Integration, Fossil Fuels, Industrial Efficiency, Renewable Energy, Finance and Nuclear Power.

AEO7 offers key energy policy proposals and strategic steps to address barriers in utilising resources to meet the demand from end-use and power sectors. It aligns the recommendations with the regional targets. In conjunction with institutional and data improvement, the report also suggests model enhancement prospects for the subsequent editions of the ASEAN Energy Outlook.

The Energy Commission, which publishes key energy information for policymakers and the energy industry as a whole, played an important role in providing accurate and valid data relating to Malaysia for the AEO7.

As a key reference for energy cooperation in the region, AEO7 paves the way for more collaborative partnerships to advance the ASEAN energy sector in navigating an energy transition that is secure, resilient, and just.

ST DATASHARE

Data as at 30 September 2023

ELECTRICITY AND PIPED GAS SUPPLY

Total Energy (GWh):
99,772 GWh

Peak Demand (MW):
19,716 MW [11 May 2023]

Installed Capacity (MW):
25,862 MW

Reserve Margin (%):
31.20%

This data only covers the Peninsular part of the grid system.

Generation Mix (%)

Coal: **57.60%**
Solar: **1.60%**
Gas: **35.90%**
Others: **0.30%**
Hydro: **4.60%**

SAIDI (Minutes / Customer / Year)

SAIDI data as of 31 August 2023 for Peninsular Malaysia and Sabah

Peninsular Malaysia:
45.77
Minutes / Customer / Year

Sabah:
307.21
Minutes / Customer / Year

ENERGY SUSTAINABILITY

PPTEC Compliance (%):

Electricity Savings under NEEAP (%)*:

5.83%
8,575 GWh
i.e., equivalent to
RM2.150 billion

*This savings is as of 30 September 2023.

Renewable Energy Installed Capacity (%)

Hydro: **55.40%**
Biomass: **7.70%**
Solar: **34.30%**
Biogas: **2.60%**

- Covers Peninsular Malaysia and Sabah only.
- Data sources are TNB, IPP, SESB, Single Buyer, SEDA, MGTC, OAS and ECOS.
- Self-gen with "other" fuel is excluded.
- Total hydro includes mini hydro capacity.
- Refers to renewable energy installed capacity in 2021.

RENEWABLE ENERGY POWER PLANTS FOR COMMISSIONING

Idiwan Solar Sdn. Bhd.
Machang, Kelantan
30.00 MW

Greenviro Solutions Sdn. Bhd.
Seberang Perai Selatan, Pulau Pinang
10.00 MW

Solar Citra Sdn. Bhd.
Kerian, Perak
10.95 MW

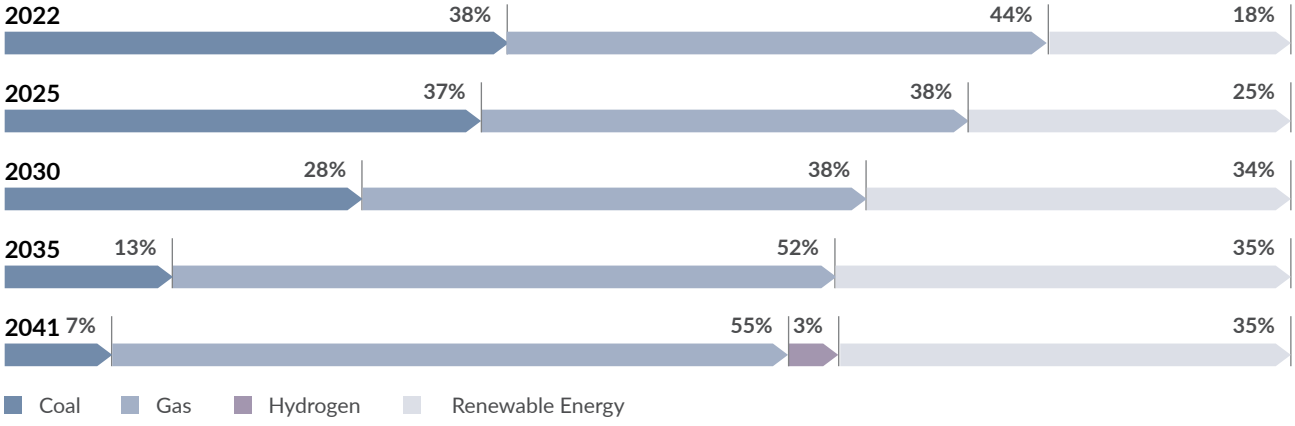
Coral Power Sdn. Bhd.
Manjung, Perak
9.99 MW

Suriamas Energy (Maritime) Sdn. Bhd.
Manjung, Perak
25.00 MW

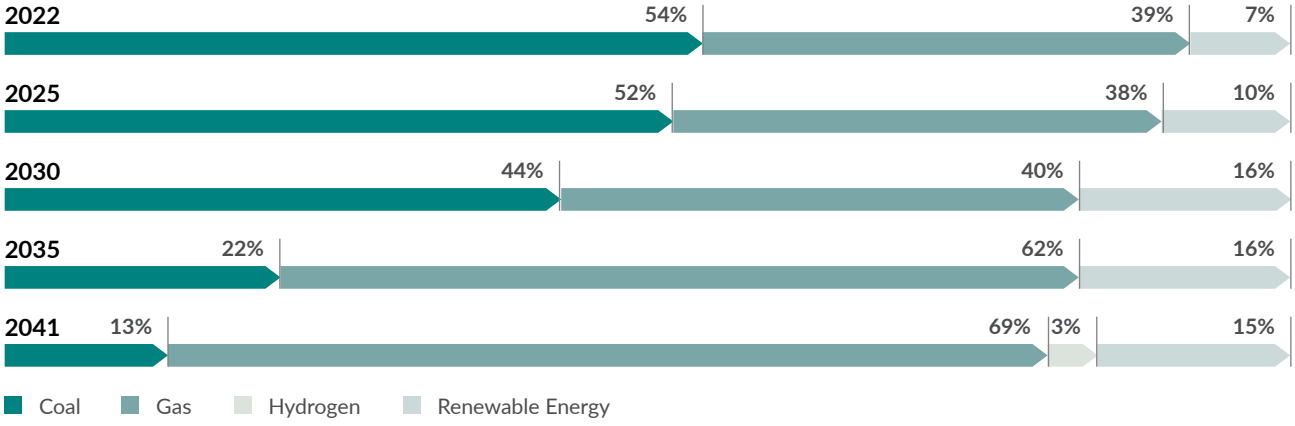
Energy ES Sdn. Bhd.
Kulim, Kedah
20.76 MW

JAKS Solar Nibong Tebal Sdn. Bhd.
Seberang Perai Selatan, Pulau Pinang
50.00 MW

PROJECTED CAPACITY MIX OF PENINSULAR MALAYSIA, 2022-2041



PROJECTED ENERGY MIX OF PENINSULAR MALAYSIA, 2022-2041



Note:
1. The above figures had been rounded up to exclude decimal points.
2. Refers to data in 2022.

ECONOMIC EFFICIENCY

Regulatory Period:

RP3 (2022-2024)

Average Base Tariff Rate for Peninsular Malaysia

39.95 Sen/kWh

Targeted Tariff Adjustment under ICPT Mechanism for July to December 2023:

- Domestic Consumers (Usage of 1,500 kWh and below): Rebate 2 sen/ kWh
- Domestic Consumers (Usage of 1,501 kWh and above): Surcharge of 10 sen / kWh
- Non-Domestic Consumers under the B, D, H, H1 & H2 and Water & Sewerage Operators Categories: Surcharge 3.7 sen/kWh
- Other Non-Domestic Consumers: Surcharge 17 sen/kWh

The Government had allocated RM5.20 billion for the implementation of ICPT from the period of July to December 2023.

REGULATORY QUALITY

Number of Complaints Received:

1,171
Complaints

Number of Complaints Resolved:

935
Complaints

Number of Complaints Under Investigation / For Further Action:

236
Complaints

SAFETY

PRIMARY CAUSES OF ACCIDENTS

ELECTRICITY	PIPED GAS
Work activities near electrical installations and improper maintenance	None

PRIMARY ACCIDENT LOCATIONS

ELECTRICITY	PIPED GAS
Residential Areas	None

Number of Electrical Accidents:

32 Cases

Number of Piped Gas Accidents:

0 Cases

COMPETENCY & CONTRACTORS

Total Number of Electrical Certificates of Competency Issued:

3,388 Certificates

Number of Electrical Contractor Registrations (ERC, EC, ESC, ESIC, SBM, PWU)

8,151 Registrations

Total Number of Institutions Accredited to Facilitate Electrical Competency Examinations:

137 Institutions

Total Number of Gas Certificates of Competency Issued:

1,240 Certificates

Number of Gas Contractor Registrations:

119 Registrations

Total Number of Institutions Accredited to Facilitate Gas Competency Examinations:

2 Institutions

ERC: Electrical Repair Contractor
EC: Electrical Contractor
ESC: Electrical Service Contractor
ESIC: Electric Sign Contractor
SBM: Switchboard Manufacturer
PWU: Private Wiring Unit

CERTIFICATES OF APPROVAL

Number of Certificates of Approval for Electrical Equipment:

7,700 Certificates of Approval and **5,084** Renewals

Number of Certificates of Approval for Manufacturers and Importers for Electrical Equipment:

216 Certificates of Approval
582 Renewals

Number of Certificates of Approval for Gas Fittings, Appliances and Equipment:

1,126 Certificates of Approval

Number of Certificates of Approval for Manufacturers, Assemblers and Importers of Gas Equipment:

132 Certificates of Approval

Number of ATI and ATO:

1,559 ATI and **1,456** ATO

ELECTRICAL AND GAS LICENCES

Number of Electrical Licences:

3,329 Licences

Number of Third Party Access Licences:

39 Licences

Number of Private Gas Licences:

3,718 Licences

Number of Retail Gas Licences:

647 Licences

INVESTIGATION PAPERS

Number of Investigation Papers Opened for Legal Action:

44 Investigation Papers

Number of Prosecution Cases:

2 Cases

Number of Compounds:

46 Compounds

Amount of Compounds Paid:

RM88,500.00

THE FUNDING DILEMMA

Nizam Mohamed Nadzri
Chief Executive Officer,
Malaysia Debt Ventures Berhad.

The switch to sustainable energy requires substantial investments in technology as well as operational infrastructure. But a major stumbling block is access to capital, an issue especially for SMEs and micro-SMEs. Here, Malaysia Debt Ventures Berhad's Chief Executive Officer Nizam Mohamed Nadzri tells us of the green growth financing options available in the country, challenges faced by applicants, and what more can be done.

> The Government has initiated several financial instruments and financing options for businesses wishing to adapt to sustainable energy in Malaysia.

Through the Sustainable Energy Development Authority (SEDA) Malaysia, it offers incentives such as the Green Investment Tax Allowance (GITA) and Green Income Tax Exemption (GITE). Additionally, there is the Green Technology Financing Scheme (GTFS) that offers a 2% p.a. interest / profit rate subsidy for the first seven years and a 60% Government guarantee of green component cost to financial institutions.

In the 2023 Budget, GTFS increased its total guarantees to RM3 billion until 2025, providing guarantees for financing amounts from RM10 million to RM500 million for projects that support the Government's relevant policies and targets to address climate change, biodiversity, and environmental challenges. The Malaysian Government has also extended GITA and GITE until the end of 2025, with incentive periods extended from three to five years. The aim is to generate 20% of energy consumption from renewable resources by 2025 and reduce greenhouse gas emission intensity by 45% by 2030.

In the meantime, Bank Negara Malaysia has allocated RM2 billion in loans for SMEs to adopt low-carbon practices, while Khazanah Nasional has allocated RM150 million for SMEs to develop environmentally friendly projects, including carbon credits and forest replanting.

Private Actions

The 12th Malaysia Plan (2021-2025) with its "advancing green growth" priority has seen financial institutions rallying to deliver Government targets in terms of sustainable energy development. They have responded with the following strategies:

- **Providing access to capital**

To provide necessary capital to fund sustainable energy projects, especially for small and medium sized enterprises (SMEs) and start-ups that may have limited access to traditional financing sources. This can include debt financing, equity investments, venture capital, or impact investing. With these efforts, financial institutions can help to unlock the potential of sustainable energy and create new opportunities for economic growth and job creation.

- **Developing innovative financing models**

To develop new financing models that align the interests of investors and project owners and better capture the long-term benefits and risks of sustainable energy investments. Through innovative financing models, financial institutions can help to bridge the funding gap for sustainable energy projects and accelerate their adoption. Such models can include revenue-based financing, performance-linked loans, green bonds, and other forms of impact investing.

- **Offering technical assistance and advisory services**

To provide technical assistance and advisory services to project owners and investors to help them navigate the complex landscape of sustainable energy development. This can enhance the quality and impact of sustainable energy projects and improve their chances of success. Such services can include market research, feasibility studies, risk assessments, project management, and monitoring and evaluation.

- **Advocating for policy and regulatory reforms**

To advocate for policy and regulatory reforms that support the growth of sustainable energy and create a level playing field for investors and project owners. The goal is to create an enabling environment for sustainable energy development and attract more private sector investments. Reforms can take the form of tax incentives, feed-in tariffs, renewable energy targets, and other measures that promote the transition to a low-carbon economy.

Organisations, big and small, can now choose several products rolled out by Malaysian banks such as CIMB, Maybank and RHB. Local fund management companies have also entered the space, with Kenanga Investors and Hwang Affin Asset Management launching funds that invest in companies committed to sustainable practices and technologies, including those related to renewable energy and energy efficiency.

- **Introducing Bursa Carbon Exchange (BCX)**

Bursa Malaysia has launched a voluntary carbon market exchange called the Bursa Carbon Exchange (BCX). The first Shariah-compliant carbon exchange in the world, BCX aims to enable companies to trade voluntary carbon credits from climate-friendly projects and solutions, with the goal of offsetting their emission footprint and meeting climate goals. The BCX has been set up to support Malaysia's net zero carbon emissions by 2050 ambition, while accelerating Corporate Malaysia's pivot towards a green economy and meeting global demand for a sustainable supply chain. The first trades will be conducted via an auction which will facilitate price discovery for the new standardised carbon credit products listed on BCX.

SME Success Stories and Setbacks

For SMEs adopting solar energy to save on electricity costs, the Government provides an enabling environment with tax breaks and low-interest loans to encourage the growth of renewable energy. Making solar energy their preferred energy source also improves a company's business reputation as a socially responsible and sustainable organisation.

In the revised Budget 2023, Bank Negara Malaysia has allocated RM2 billion in funding for sustainable technology start-ups and to help SMEs implement low-carbon practices.

Unfortunately, SMEs, particularly micro-sized ones, seeking green growth financing are usually hindered by their lack of track record and equity participation details. Financiers are also having difficulty comprehending the complexity of their projects and technologies. The fact is financial convention requires lenders to want to know their borrowers' performance in terms of corporate governance, cash flow sustainability in generating demand and the shareholder equity profile.

At Malaysia Debt Ventures Berhad (MDV), we are a firm supporter of the Government's aim to assist the development technology based local SMEs, particularly innovative and high-growth companies capable of generating high-income jobs for the people and driving the country's economic growth.

In September 2023, MDV ventured into the Initial Exchange Offering (IEO), with an investment agreement with Kapital DX Sdn. Bhd. The investment is part of a collaboration to also diversify MDV's funding avenues and broadening of its digital presence through participation in alternative financing platforms. MDV also intends to leverage on the platform to finance tech projects related to the National Energy Transition Roadmap (NETR), especially in the area of renewable energy and energy efficiency.

Our green financing products favour projects relating to alternative fuels, ranging from waste, biomass, biogas to solar and hydro. We also insist that applicants minimise their project's impact on the environment and promote the use of renewable energy resources to some extent.

MDV: The Tech SME Stronghold

Malaysia Debt Ventures Berhad (MDV) was established by the Government in 2002 with the objective of providing flexible and innovative financing facilities to support Multimedia Super Corridor (MSC) IT-related projects. This was its flagship venture, and it is still ongoing.

In recent years, MDV expanded its scope to cover sustainability projects, especially sustainable energy financing. Its focus is project financing and it is making inroads with energy performance contracting financing.

"When we started lending to sustainable energy projects, there was no one else, even for solar projects," says MDV CEO Nizam Mohamed Nadzri. "We were the only ones financing renewable energy projects and became the largest GTFS financier then. Now, conventional banks have entered this space and we compete with them. Sometimes we partner with banks and they ask us to take the lead because of our experience.

"For renewable energy, we provide financing mainly to smaller players for their FiT projects, namely, mini hydro, biomass and biogas projects. Three quarters of our customers are SMEs. Large scale solar operators usually go to the capital markets for financing," he added.

With building energy efficiency being incentivised, even penalised for poor performance, there is now a demand for energy performance contracting services. MDV has now embarked on financing this market segment.

To date, MDV has successfully financed more than 120 green technology related companies with a combined value of RM1.68 billion. They include technology companies such as the Cenergi Group and Concorde Alliance that have executed various award-winning green projects. With Concorde, for example, MDV has been their financing partner since 2016, for four of its biogas plants. Similarly, MDV extended financing to Cenergi for its solar PV projects.

We also provide tech based SMEs with working capital to meet their operational requirements. Consisting mainly of vendors / solution providers, these SMEs play a supporting role in establishing a green ecosystem in Malaysia. But they are often unable to secure funding from commercial banks because they do not have the kind of track record or equity that conventional banks seek. MDV usually steps in to assist them in such situations.

Admittedly, SME funding is not without its drawbacks. There is the risk of project failure and delay due to various reasons such as the unprecedented COVID-19 pandemic in 2020-2021. Some projects were delayed due to the Movement Control Order (MCO); there were also those that faced cost overruns due to price fluctuations. Notwithstanding these setbacks, we assessed these impacts and where possible, MDV would try to support affected companies. For example, we would grant a grace period for repayments or provide options such as rescheduling their financing based on the merit of the cases.

Micro-SMEs (MSMEs) are another segment in need of support. The Capital Market Blueprint identifies them as being unserved or underserved, and having an estimated RM90 billion in financing gap. Challenges and drawbacks aside, MDV will continue to intensify efforts to assist tech MSMEs seeking financing options so that they can grow and succeed.

"To date, MDV has successfully financed more than 120 green technology related companies with a combined value of RM1.68 billion."

What More Can Be Done

To address the funding dilemma faced by micro, small and mid-size SMEs seeking green growth finance in Malaysia, several actions can be taken:

- **Create awareness**

The Government and financial institutions can create awareness among SMEs about the availability of green finance options and the benefits of transitioning to sustainable practices.

- **Develop specialised financing products**

Financial institutions can develop specialised financing products that cater specifically to the needs of SMEs seeking green growth finance. These products could include longer repayment periods, lower interest rates, or other features that make financing more accessible and affordable for SMEs.

- **Simplify application processes**

Financial institutions can simplify the application process by streamlining documentation requirements and providing guidance to SMEs throughout the application process.

- **Provide technical assistance**

Technical assistance and support services can be provided to help them prepare for and implement green projects, including assistance with project feasibility studies, engineering and design, and project management.

- **Facilitate partnerships**

Financial institutions can facilitate partnerships between SMEs and other stakeholders in the green economy, such as renewable energy companies, to provide access to technology, expertise, and networks.

- **Increase Government support**

The Government can provide financial incentives and tax breaks for SMEs that adopt sustainable practices and invest in green projects.

Future Forward: Community Solar

There is an emerging market segment in the sustainable energy space: communities.

While most prosumers to date are big organisations and an increasing number of SMEs and MSMEs, there is a new trend that is seeing communities coming together to produce and consume their own renewable energy. This is the concept of community solar, also known as shared solar, which has gained traction in recent years as a way for individuals and communities to access the benefits of solar power without having to install solar panels on their own rooftops.

Under the community solar model, a solar array is installed in a central location, and members of the community can purchase or lease a portion of the solar panels to generate electricity. The electricity generated is then credited to their utility bill, allowing them to save money on their electricity costs.

Community solar projects are often initiated by Local Governments or non-profit organisations, but there is potential for private companies to develop and finance such projects as well. This would enable communities to become prosumers by collectively owning and generating their own renewable energy.

In Malaysia, there have been some initiatives to promote community solar, such as the Net Energy Metering (NEM) programme, which allows households and businesses to install rooftop solar PV systems and sell excess electricity back to the grid. However, the programme is limited to individual installations, and there has not been a significant push towards community solar projects.

Nevertheless, with growing awareness and interest in renewable energy, it is possible that we will see more community solar projects and prosumers emerging in Malaysia in the foreseeable future.

When community prosumers emerge, financing will be required to support the development and operation of community solar projects.

Banks and financial institutions can play a significant role in providing financing solutions that meet the unique needs of community solar projects.

One financing option for community solar projects is through community bonds, where investors can purchase bonds that provide a return on investment over a set period of time. This type of financing allows communities to raise the necessary capital to develop a solar project without relying on traditional bank loans.

Another financing option is through crowdfunding, where individuals can contribute small amounts of money towards a solar project in exchange for a stake in the project's ownership or a share of the project's profits. Crowdfunding can provide a way for communities to raise capital quickly and easily, while also increasing public awareness and support for renewable energy.

Banks and financial institutions can also develop specialised loan products or financing packages that cater specifically to the needs of community solar projects. These products could include longer repayment periods, lower interest rates, or other features that make financing more accessible and affordable for community-based projects.

In terms of how banks will receive community prosumers, it will depend on the specific business model and ownership structure of the community solar project. If the project is structured as a cooperative or community-owned enterprise, banks may work directly with the project's leadership or board of directors to provide financing.

Alternatively, if the project is owned by a private developer or third-party investor, banks may provide financing directly to the developer or through other intermediaries. Overall, the development of community solar projects and prosumers will require innovative and flexible financing solutions that can meet the unique needs of these types of projects.

"Banks and financial institutions can play a crucial role in providing this financing and supporting the transition towards a more sustainable energy system.

Sustainable Energy Financing: Global Models to Emulate

Sustainable energy financing has a key role to play in the world's transition to net zero by channelling private money into carbon-neutral projects. There are several global examples that Malaysia can emulate to make funding more accessible to more companies.

World Bank Group's International Finance Corporation (IFC) is the leading provider of green loans among international development banks . Green loans are a form of financing that enables borrowers to use the proceeds to exclusively fund projects that make a substantial contribution to an environmental objective. In Brazil, IFC is helping to boost financing for climate-friendly projects with green loans of up to $120 million provided to Sicredi, a Brazilian cooperative financial institution.

Another good example is the UK's Green Investment Bank (GIB – now privatised and renamed Green Investment Group (GIG)). Established in 2012, GIC was the first institution of its type in the world; it was publicly funded and designed to mobilise private finance into the green energy sector. With the mission to accelerate the country's transition to a low-carbon economy by providing sustainable energy financing to companies between 2012 and 2017, GIC helped finance more than £12 billion of UK green infrastructure projects before being acquired by the Macquarie Group.

Malaysia can emulate the IFC and GIG by establishing its own sustainable energy financing institution, setting clear investment criteria, providing financial incentives, building partnerships, and developing a pipeline of sustainable energy projects.

ENERGY MALAYSIA

For comprehensive insights and information on the energy industry in Malaysia and what's trending in the New Energy World.

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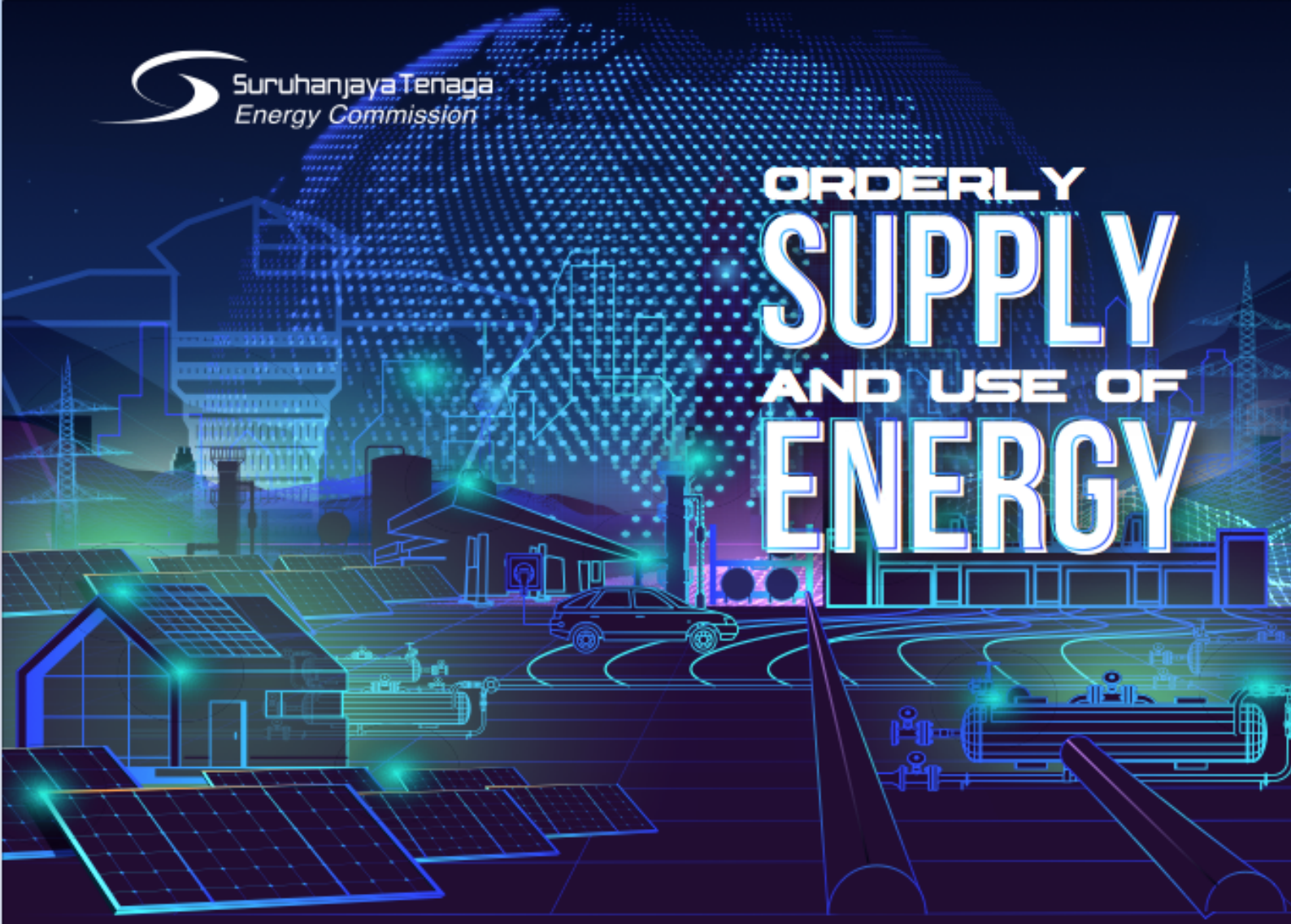
Energy Sector Regulation Excellence

A recognition for regulatory excellence in Malaysia's energy sector, especially in driving the country towards clean energy sources to meet our nation's energy transition goals.

Suruhanjaya Tenaga
Energy Commission

ORDERLY SUPPLY AND USE OF ENERGY



Suruhanjaya Tenaga (ST), a statutory body established under the Energy Commission Act 2001, is responsible for regulating the energy sector, specifically the electricity supply and piped gas supply industries in Peninsular Malaysia and Sabah.

THE ENERGY COMMISSION

ADVISES
the Minister on all matters concerning the national policy objectives for energy supply activities, the supply and use of electricity, the supply of gas through pipelines and the use of gas.

REGULATES
electricity and piped gas tariffs and the quality of supply services, as well as promotes competition and prevents misuse of monopoly power.

PROMOTES
good practices, as well as research, development and innovation in the electricity and piped gas industries.

PLANS AND DEVELOPS
laws, regulations, rules, guidelines and programmes for the orderly development and functioning of the electricity and piped gas industries.

LICENSES AND CERTIFIES
electricity and piped gas suppliers, competent electricity and gas personnel, training providers, contractors, equipment and installations, energy service companies and energy managers.

MONITORS AND AUDITS
performance and compliance of licensed and certified suppliers, service providers, installations, equipment importers, manufacturers and retailers.

INVESTIGATES
complaints, accidents, offences and industry issues; and enforces compliance.

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