

# ENERGY

www.st.gov.my

M A L A Y S I A

Volume 23 | 2022

## CONSUMER

Home Rooftop Solar:  
A Reality Check

## Q&A

New Pathways and  
Opportunities

## THEN & NOW

Malaysia's Energy Policies  
Through the Years

## SPECIAL FOCUS

Large Scale Solar in Malaysia:  
Where Are We Now?

## COVER STORY

# TOWARDS A CARBON NEUTRAL MALAYSIA 2050

Be Energy  
**smart**

ISSN 2948-3603



9 7 7 2 9 4 8 3 6 0 0 3

# CONTENTS

**ADVISOR**

Dato' Ir. Ts. Abdul Razib Dawood

**MANAGING EDITOR**

Kauthar Mohd Yusof

**EDITOR**

Sueharti Mokhtar

**ASSOCIATE EDITORS**

Adnan Abdullah

Zairulliati Mali

COVER STORY

## TOWARDS A CARBON NEUTRAL MALAYSIA 2050



CONSUMER

### HOME ROOFTOP SOLAR: A REALITY CHECK



SPECIAL FOCUS

### LARGE SCALE SOLAR IN MALAYSIA: WHERE ARE WE NOW?



INNOVATION

### KEEPING A LID ON EMISSIONS

**PUBLISHED BY**

Suruhanjaya Tenaga (Energy Commission)  
No. 12, Jalan Tun Hussein, Presint 2, 62100 Putrajaya,  
Malaysia  
T : (603) 8870 8500 F : (603) 8888 8637  
[www.st.gov.my](http://www.st.gov.my)

**PRINTER**

Dolphin Press International Sdn. Bhd. (0803493W)  
No. 1, Jalan 13/118B, Desa Tun Razak, 56000 Kuala Lumpur

**PUBLISHING CONSULTANT**

pVm communications sdn. bhd.  
[www.pvmpublish.com.my](http://www.pvmpublish.com.my)

**WRITERS**

Premilla Mohanlall  
Dyll Rohan Selveraj  
Magella Gomes  
Azizah Binti Mohamad

## REGULARS

COMMENTARY	2
The Twin Towers of Carbon Neutrality	
INDUSTRY BITES	3
News from Malaysia and Around the World	
HAPPENINGS	46
ST Events and Related Stories	
STATS & FACTS	51
ST DataShare	

## FEATURES

COVER STORY	10
Towards a Carbon Neutral Malaysia 2050	
CONSUMER	18
Home Rooftop Solar: A Reality Check	
Q&A	24
New Pathways and Opportunities	
INNOVATION	28
Keeping a Lid on Emissions	
SPECIAL FOCUS	32
Large Scale Solar in Malaysia: Where Are We Now?	
BEYOND BORDERS	36
China's Road to Clean Energy	
THEN & NOW	40
Malaysia's Energy Policies Through the Years	
PARTING SHOT	54
Listen Before You Leap	

# WELCOME TO OUR NEW CHAIRMAN

## WE WARMLY WELCOME THE APPOINTMENT OF MOHAMMED RASHDAN MOHD YUSOF AS OUR NEW CHAIRMAN EFFECTIVE 1 FEBRUARY 2023.

Mohammed Rashdan has extensive experience in the economic sector and company management, especially in the field of corporate restructuring and investment banking, having served as the Deputy Managing Director of the Gamuda Group from 2018.

Prior to that he was the Managing Director of QuantePhi Sdn. Bhd. from 2012-2018, and Executive Director of Investments at Khazanah Nasional Berhad from 2010-2012.

Mohammed Rashdan has also served as the Chief Executive Officer and a member of the Board of Directors at Maybank Investment Bank from 2008-2010.

Mohammed Rashdan began his career as an accountant at PricewaterhouseCoopers (PwC), after completing his Master's degree with Honours in Economics from the University of Cambridge, England.

We look forward to his leadership to lift the Commission to the next stage of our growth cycle.

### ... AND THANK YOU TO DATO' AZIAN OSMAN

We also wish to express our gratitude to the Commission's former Chairman, Dato' Azian Osman, for his services during his tenure from 8 May 2020 to 14 February 2023.

He has made substantial contributions to the Commission, in terms of experience and insightful ideas towards achieving the Commission's aspirations, vision and mission.

During his term of office, the Commission introduced LSS@ MEnTARI to attract RE investments to boost the country's economy during the COVID-19 pandemic. Another highlight was electricity bill discounts, introduced to ease the financial burden of consumers during the pandemic.

Thank you Dato' Azian.



Malaysia took the lead among Southeast Asian nations when the Prime Minister announced Malaysia's aspiration to achieve net zero carbon by 2050, at the earliest. The announcement was made at the tabling of the 12th Malaysia Plan in September 2021, and reconfirmed at COP26 held at Glasgow two months later in November. The Prime Minister reaffirmed this commitment at the United Nations General Assembly in September 2022.

What does this mean for us in the electricity and gas supply industry?

Put simply, there are two towers for us to climb, both at the same time. The first one is to intensify renewable energy generation; and the second one is to incorporate energy efficiency into an Act that will guide consumers on behavioural changes that will result in energy efficiency becoming a way of life.

Without a doubt, we have to reduce our dependency on fossil fuels to produce electricity. Coal will no longer be an

option, as our Cover Story "Towards A Carbon Neutral Malaysia 2050" tells us. Instead, we have to step up with sustainable energy production to meet the Government's target for 31% renewable energy in the installed capacity by 2025, and 40% by 2035.

Energy efficiency is another frontier to tackle, and the National Energy Policy that was presented in September 2022 will serve as our guide. Its target is to boost energy efficiency by 11% for commercial and industrial consumers who account for 80% of electricity consumption; and 10% by domestic consumers. Another route is through legislation, with the implementation of the Energy Efficiency and Conservation Act, which has been drafted by the Commission.

As our Cover Story notes, sustainable energy is not new. We have been on this journey for decades. The story "Malaysia's Energy Policies Through The Years" in the Then and Now section confirms this. What is new as highlighted in the Cover Story is the introduction of a carbon trading mechanism. A Domestic Emissions

Trading System has been developed in Malaysia and it will begin operations at the end of 2022.

On our part, the Commission is pressing on as the implementing agency for the Large Scale Solar (LSS) Programme introduced in 2016, which is to increase renewable energy capacity. Our Special Focus section provides updates with the story "Large Scale Solar In Malaysia: Where Are We Now?"

In the Q&A section, Boston Consulting Group's Dave Sivaprasad provides insights on trends among green energy investors and investment opportunities in Malaysia's renewables space in the piece entitled "New Pathways And Opportunities". We also do a reality check in the Consumer section on home rooftop solar and initiatives taken to promote the take-up rate.

"Keeping A Tight Lid On Emissions" in the Innovation section, explores Carbon Capture Storage (CCS) and Carbon Capture, Utilisation and Storage (CCUS) technologies, to remove carbon emissions from the atmosphere. It draws attention to projects in Sarawak which are set to become the largest offshore CCS projects in the world. The endgame is for Malaysia to become a regional CCS hub, offering excess capacity slots to third parties.

The Commission is proud to receive PEMUDAH's Special Award in recognition of our role in Malaysia's improved ranking in the World Bank's Doing Business Report 2020 for the "Getting Electricity" category. Another important news is the changing of the guard at the Ministry, which saw the departure of the Deputy Secretary General (Energy), Puan Noor Afifah Abdul Razak, who has been replaced by Dato' Mohamad Razif bin Haji Abd Mubin.

We thank Puan Afifah for her leadership and unstinting support, and look forward to Dato' Razif's foresight and guidance to achieve our 12th Malaysia Plan (2021-2025) and National Energy Policy (2022-2040) objectives and targets.

Thank you.

# THE TWIN TOWERS OF CARBON NEUTRALITY



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



# NEWS FROM MALAYSIA AND AROUND THE WORLD

## MALAYSIA

### SABAH TO REGULATE OWN ELECTRICITY AND GAS SUPPLY

The Chief Minister of Sabah has set in motion plans to take over Sabah Electricity Sdn. Bhd. (SESB) gradually, with the setting up of the Energy Commission of Sabah (ECoS).

According to a statement issued by his department, the Minister had co-chaired a series of high-powered committee meetings with the relevant Ministries, including the Prime Minister's Department today.

"During the first meeting of the Steering Committee on the handing over of the electricity supply regulatory power and SESB to the Sabah Government, it was agreed that Sabah's plan to take over SESB in two stages will be brought up to the Federal Cabinet," the statement read. The Chief Minister said the State Government first had to set up its own Sabah Energy Commission so that the electricity supply regulatory authority can be transferred from the Federal Government to Sabah.

After that, it is expected that SESB is taken back by the State Government with zero liabilities once the SESB Transformation Plan is completed within five to seven years from now.

"Hence, coordination and cooperation from all are needed to ensure the legal process is implemented smoothly," he said. SESB's current stakeholders are Tenaga Nasional Berhad (TNB), with 80%, while the State Government owns the remaining 20%.

The Chief Minister also co-chaired the steering committee meeting to hand over the management and control of its gas resources with the Economic Planning Unit (EPU). He said the State Government's move to take over the management and control of the gas supply in Sabah was in line with the various related initiatives that have been planned and implemented in the State.

"It will allow us to have direct involvement in oil and gas industry activities for the benefit of Sabah," he said. "The State Government is committed to ensuring the gas industry in Sabah will continue to be developed through related policies without compromising on the safety and service efficiency to consumers as well as ensuring no disruption in operations during the transition period," he added further.

The discussion also touched on proposed programmes and projects to be implemented under the Sabah Power Supply Generation Development Plan (2022-2041).

*Malay Mail, 25 August 2022*

*"Solar power, coupled with BESS, could be the solution for intermittence. It can also complement existing power grids."*

### THE COMMISSION STUDYING POTENTIAL OF A BESS SOLUTION

The Energy Commission is studying the potential of building a Battery Energy Storage System (BESS) to support intermittent solar power. Chief Executive Officer, Dato' Ir. Ts. Abdul Razib Dawood, said the study was to determine its suitability before being proposed to the Government.

"We are looking for a suitable location to develop BESS as well as its cost and capacity.

"Among the countries that have such infrastructure are Hawaii and Australia," he told the New Straits Times at the 5th International Sustainable Energy Summit (ISES). Dato' Razib, a panel speaker at the session entitled 'Empowering Energy Transition', said that the technology could address the unstable solar power supply.

"Solar power, coupled with BESS, could be the solution for intermittence. It can also complement existing power grids. So, instead of continuously investing in improving power grids, energy storage could help in meeting increasing demand for electricity," he added.

Earlier, Dato' Razib told ISES delegates that the Commission was revisiting the idea of building a small modular reactor by making use of similar onboard nuclear technology powering submarines."

*New Straits Times, 29 August 2022*



## 349 BITCOIN MACHINES CONFISCATED FOR ELECTRICITY THEFT

Five bitcoin mining premises around Kajang were raided for electricity theft under Ops Renjat, a joint operation led by the Energy Commission and supported by the National Financial Crime Prevention Centre, Royal Malaysian Police, Tenaga Nasional Berhad (TNB) and Malaysian Fire and Rescue Department (BOMBA).

The Commission's Chief Executive Officer, Dato' Ir. Ts. Abdul Razib Dawood, said that the 349 bitcoin machines, including hard drives, wires and fans, estimated to be worth more than RM2 million were confiscated during the raid. The bitcoin mining operations caused TNB to suffer losses in excess of RM1.3 million worth of electricity supply due to an illegal bypass connection that did not go through the standard meter.

The raid was carried out following complaints received from consumers in the area who often experienced power outages. Subsequent investigations conducted by the Commission and TNB at the location exposed the theft.

Speaking at a press conference after the raid, Dato' Razib added, "Please remember that electricity theft by irresponsible parties causes supply disruptions and also poses as a public security threat."

He explained that during the raid, the premises were unoccupied and that investigations were conducted based on the name on the electricity bill.

*KOSMO! Online, 6 October 2022*

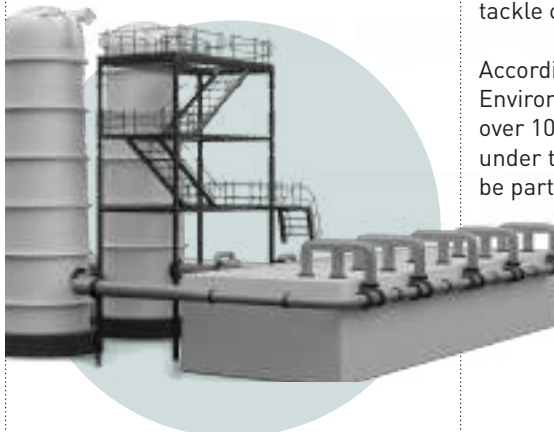
## CGPP, FOR MORE COMPANIES TO USE GREEN ENERGY

The Government has introduced the Corporate Green Power Programme (CGPP) to encourage more corporate companies in Malaysia to use green electricity through the installation of solar photovoltaic (PV) systems.

The Energy and Natural Resources Minister said CGPP would enable corporate companies operating in Malaysia to achieve their Environmental, Social and Governance (ESG) commitments through the Virtual Power Purchase Agreement (VPPA) mechanism that had a total quota of 600 MW. "This is estimated to be adequate to maintain existing companies, as well as attract other international companies to invest in Malaysia," he said when announcing the programme.

Companies in Malaysia can also fulfil their green energy commitments through the Net Energy Metering (NEM) and Self Consumption (SelCo) programmes. In addition, they can purchase Renewable Energy Certificates (REC) or subscribe to the Green Electricity Tariff (GET).

The Minister added that under CGPP, eligible corporate companies could enter into a Corporate Green Energy Agreement with solar energy generators for the sale and purchase of renewable energy virtually. The agreement / contract is a two way financial hedge agreement, with a detailed pricing structure agreed upon by the buyer and seller. It takes into account the value or financial benefits available through the reduction of greenhouse gas (GHG) emissions to be derived from solar power generation.



"This contract will enable the generator to participate in the electricity market operated by the Single Buyer through the New Enhanced Dispatch Arrangement (NEDA) mechanism," he said. He added that the agreement would reduce the risk borne by solar energy generators due to fluctuations in electricity market prices. At the same time, it will enable corporate companies to get a virtual supply of green electricity at a fixed price for a scheduled period.

Participating companies could also obtain RECs from the solar power generator to reflect their Environmental, Social, and Governance (ESG) commitments.

To ensure transparency in the evaluation of applications, a Special Evaluation Committee comprising representatives of the Ministry, Energy Commission and Single Buyer is to be established.

*Bernama, 31 October 2022*

## COP27: MALAYSIA TO FOCUS ON ADAPTATION, CLIMATE FINANCE AND SHOWCASING LOCAL SOLUTIONS

Malaysia is sending its biggest ever delegation to the annual United Nations Climate Change Conference 2022 (COP27) in Sharm El-Sheikh, Egypt, and setting up a Malaysia Pavilion to showcase local solutions to tackle climate change.

According to the Ministry of Environment and Water (KASA), over 100 delegates are registered under the Ministry, 30% of whom will be participating in the negotiation

process. The rest are representatives from the private sector and non-governmental organisations (NGOs), who will be involved in activities at the Pavilion or other side events. COP27 kicked off on November 6 and will go on for two weeks.

The negotiation team will continue with its mandate and focus on a few key items, including finalising rules for the compliance-based carbon market, ironing out the process for the Global Stock Take (GST) in 2023, and demanding more assistance in climate change adaptation and climate finance from developed countries.

“The process related to the GST is very important. At the moment, we don’t know what is happening in the world. We are doing this and that, but we can’t know for sure about the GST,” said Malaysia’s COP27 lead delegate, Datuk Seri Dr Zaini Ujang, Secretary General of KASA.

“Adaptation finance is crucial for developing countries. The allocation of funding from developed countries is skewed towards mitigation. The technology is there already for mitigation. The question is on adaptation. We are still struggling to deal with flooding and other issues.”

Zaini added, “Under the Glasgow Climate Pact at COP26, we have seen significant progress in advancing technical assistance from relevant organisations to address learning and development in developing countries. But the definition is very vague at the moment.”

Another topic is enhanced nationally determined contributions (NDCs), which are each country’s climate targets. After COP26, countries were encouraged to revisit their 2030 NDCs to align it with the Paris Agreement goal to limit global warming to below 1.5 degrees Celsius.

“Malaysia won’t be doing it this year since it updated its NDC last year to reduce economy-wide carbon intensity (against GDP) by 45% unconditionally by 2030. “It’s already very ambitious. We have the option to revise the NDCs every five years. We hope that after our Long-Term Low Emissions Development Strategy (LT-LEDS) report is completed, we can have a new NDC. That could be any time before 2025,” said Zaini.

*Edge Markets, 07 November 2022*

*“Adaptation finance is crucial for developing countries. The allocation of funding from developed countries is skewed towards mitigation. The technology is there already for mitigation. The question is on adaptation.”*

## DECARBONISATION OF POWER SECTOR CHEAPER THAN ‘BUSINESS AS USUAL’, SAY INDUSTRY WATCHERS

Malaysia could save as much as US\$250 billion on its cumulative energy system if it aligned its decarbonisation efforts with a 1.5 degrees Celsius scenario, making for a “compelling cost argument”, according to International Renewable Energy Agency (IRENA).

“Malaysia’s switch to renewable energy is actually less costly than business as usual, and that is largely a result of the competitiveness of renewable energy technology,” said IRENA’s programme officer Nicholas Wagner at a panel session at Malaysia’s COP27 Pavilion in Sharm El-Sheikh, Egypt recently.

However, achieving these cost savings will require higher upfront investments than the energy sector had previously allocated towards an expansion in renewable energy technologies, he said, citing examples of costly initial infrastructure needed, such as energy storage, electric vehicle charging stations and hydrogen electrolyzers.

Malaysia’s energy sector is currently the largest source of greenhouse gas emissions in the country, accounting for about 80% of national carbon

emissions. Its economy is also heavily reliant on oil and gas, which accounts for one-fifth of the country’s gross domestic product.

Although more than 90% of electricity in Malaysia continues to be generated from fossil fuels, the Government has reiterated its commitment to increase its renewable energy share to 31% by 2025.

“You most certainly need coordination among all the different Governments, non-governmental and private sector actors to realise these renewable energy goals,” said Wagner. IRENA is currently working with Malaysia’s Ministry of Energy and Natural Resources to produce a long-term energy transition outlook and roadmap for Malaysia, which is expected to be released next year.

Malaysia does not need to go it alone in its energy transition efforts, however. “The energy transition that is needed is so substantial that the ASEAN region also has to coordinate and work together,” Wagner said.

According to IRENA’s estimates, the region will require US\$6-7 trillion of investment in the energy transition, of which Malaysia requires US\$450 billion.

Among financial actors, multilateral development banks are crucial for financing the energy transition, but they are not able to provide capital that is catalytic enough, said Jay Collins, Vice Chairman of Banking, Capital Markets and Advisory at Citigroup and fellow panellist at COP27.

Instead of focusing on the “bankability” of projects, Collins urged private financiers to focus on financing project development instead. “We don’t even have enough projects to see if they are bankable or not,” he said.

This view was echoed by Malaysia’s Khazanah Nasional. The sovereign wealth fund’s senior vice president of investment Elaine Ong called on investors and lenders to be more “courageous” in funding more catalytic projects.

*Eco-business, 30 November 2022*



## MALAYSIA'S POWER SECTOR UNDER PRESSURE

The domino effect of skyrocketing fuel prices due to geopolitical tension between Ukraine and Russia, coupled with the volatility in supply and demand, has influenced coal prices and exerted extreme pressure on the power generation industry in Malaysia and globally.

Throughout the year, the benchmark Newcastle Coal futures prices breached US\$440 per tonne on 2 March 2022 following Russia's invasion of Ukraine on 24 February 2022. It then fluctuated and touched a record high of US\$457.80 per tonne on 5 September 2022 due to the fact that demand for coal spiked but output from Europe and China shrunk.

Coal prices were higher at US\$209.70 per tonne on average in the first nine months of 2022, versus the benchmark coal price of US\$79 per tonne under the Regulatory Period 3 (RP3), which is approved for the period from 1 February 2022 to 31 December 2024.

The elevated coal price led to an increase in the electricity generation costs, which has a direct impact on electricity tariff, as coal constitutes almost 60% of the generation sources.

In Malaysia, however, consumers and entrepreneurs escaped from price pressures due to subsidies. The current tariff, implemented on 1 January 2014 under the Incentive-Based Regulation (IBR) mechanism, remained at 39.45 sen per kilowatt hour (kWh). Meanwhile, non-domestic users from the commercial and industrial sectors have been imposed a surcharge of 3.70 sen per kWh.

The Government is utilising funds from Kumpulan Wang Industri Elektrik (KWIE) to maintain the current rebate of two sen per kilowatt hour (kWh) for domestic and targeted users. The Government paid Tenaga Nasional Berhad (TNB) RM4.8 billion for the second half of 2022 under the electricity generation cost recovery

scheme based on the imbalance cost pass-through (ICPT) mechanism.

The majority of research firms foresee a higher ICPT surcharge for commercial and industrial sectors for the next implementation period which is from 1 January to 30 June 2023.

*Malay Mail, 07 December 2022*

## ENERGY COMMISSION: TNB READIES ASSETS TO ENSURE SWIFT POWER RESTORATION DURING FLOODS

Tenaga Nasional Berhad (TNB) has prepared various assets at flood-hit locations to ensure that electricity supply is fully restored. According to the Energy Commission, the assets provided are 296 mobile power generators, 227 small portable power generators, 289 lorries, 885 four-wheel drive vehicles, 38 boats and 108 floodlights in flood-prone locations. The Commission said these efforts were being carried out to ensure public safety and guarantee of continuous power supply at temporary relief centres as well as immediate power restoration in flood-hit areas.

"Looking at these preparations, the Commission hopes that the measures taken by TNB to tackle the floods can

provide a guarantee in terms of safety, supply management, dissemination of information and so on for the welfare of the public," it said in a statement today.

It added that the Chief Executive Officer Dato' Ir. Ts. Abdul Razib Dawood visited the distribution network operations room in Petaling Jaya yesterday to monitor TNB's preparations to deal with the flood situation this year.

Regarding the incident where three people died of electrocution in Tumpat, Kelantan on Monday, the Commission said it took a serious view of the tragedy and will continue to protect the interests of the community, especially in terms of electrical safety during floods.

"The Commission wishes to remind everyone to completely shut down their power supply at home if told to evacuate. If there are any problems regarding electricity supply, members of the public can contact the TNB Careline at 15454," it said.

The Commission also advised the public to comply with the electricity safety tips provided by the Commission and TNB. Members of the public who have any concerns or complaints are advised to contact the Energy Commission at 03-8870 8800, via email at e-aduan@st.gov.my or visit [www.st.gov.my](http://www.st.gov.my) for further information.

*Bernama / Malay Mail 21 December 2022*



## REDUCTION OF BASIC AVERAGE TARIFF FOR GAS FACILITIES

The Cabinet has agreed to reduce the basic average tariff for the use of gas facilities to be paid by gas users for the Second Regulatory Period (RP2) starting from 1 January 2023 to 31 December 2025.

The setting of the gas facility charge by the Government for each regulatory period is part of the country's gas market regulatory framework under the Incentive Based Regulation (IBR) framework.

Economy Minister Rafizi Ramli said the new tariff for gas facilities for RP2 involves four gas facilities, which are the regasification terminal owned by Regas Terminal Sg Udang Sdn. Bhd. (RGTSU), the regasification terminal owned by Pengerang LNG (Two) Sdn. Bhd. (RGTP), the transmission pipeline owned by Petronas Gas Berhad (PGB) and the distribution pipeline owned by Gas Malaysia Distribution Sdn. Bhd. (GMD).

"The setting of the average tariff for gas facilities for RP2, and the adjustment of income and the average tariff allowed for that period, that is, the average basic tariff for RGTSU, remains the same as the RP1 period at the rate of RM3.455/gigajoule (GJ)/day. "And there is no income adjustment for the period from 1 January to 31 December 2023," he said in a statement today.

*"...the reduction in the average tariff of gas facilities for the RP2 period was expected to provide savings in terms of energy costs to the industry."*

Rafizi also said the average basic tariff for RGTP dropped by 9.2% at a rate of RM3.165/GJ/day compared with RM3.485/GJ/day in the RP1 period, and there was no income adjustment for the period from 1 January to 31 December 2023.

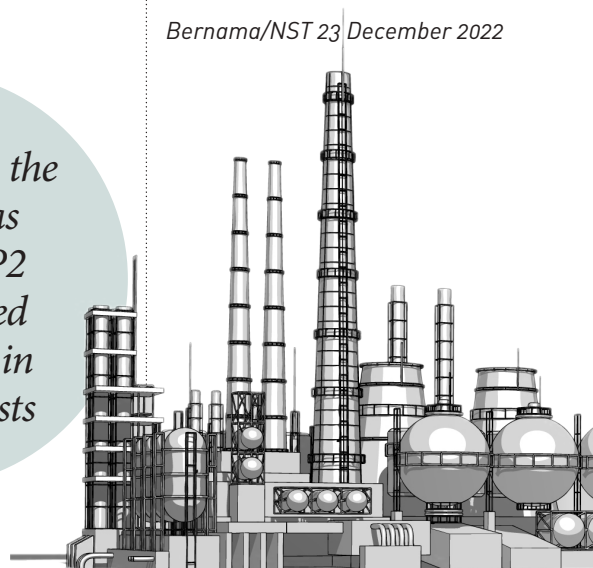
Meanwhile, the average basic tariff for PGB also fell by 5.8% at a rate of RM1.063/GJ/day, compared with RM1.129/GJ/day for the RP1 period. "The average tariff allowed for the period from 1 January to 31 December 2023 is RM1.061/GJ/day, after adjusting the excess income of RM0.002/GJ/day.

"The average basic tariff for GMD remains as it was during the RP1 period, at the rate of RM1.573/GJ/day. The average tariff allowed for the period 1 January to 31 December 2023 is RM1.535/GJ/day, after adjusting for excess income of RM0.038/GJ/day," he explained.

Rafizi said the reduction in the average tariff of gas facilities for the RP2 period was expected to provide savings in terms of energy costs to the industry. "It depends on the volume of gas consumption, the reduction in the average tariff of gas facilities is projected to translate into savings of between RM5.5 million and RM33.2 million for 2023.

"For the distribution segment according to user category whether residential, commercial or industrial, savings are between RM4,000 and RM55.9 million for 2023," he added.

*Bernama/NST 23 December 2022*



## INTERNATIONAL

### DOUBLING OF CAPACITY IN MALAYSIA-SINGAPORE INTERCONNECTOR

Singapore and Malaysia have completed the upgrading of the electricity interconnector between the two countries, said the republic's Energy Market Authority (EMA). According to EMA, since 1983, the interconnector has enabled mutual energy transfer between Singapore and Malaysia during times of power system disturbances.

"With the completion of upgrading works in August this year, the interconnector can now accommodate bidirectional electricity flows of around 1,000 MW between Malaysia and Singapore. This is double its earlier capacity and has enhanced regional energy connectivity," said EMA in a statement.

In addition to mutual support, EMA said the interconnector is currently used for cross-border power trade under the Laos-Thailand-Malaysia-Singapore Power Integration Project (LTMS-PIP).

*Bernama, 26 October 2022*

### LOW-CARBON HYDROGEN TO FUEL SINGAPORE'S ENERGY NEEDS

Singapore's Deputy Prime Minister said that low-carbon hydrogen is being seen as an increasingly promising solution.

Speaking at the Singapore Energy Lecture at the start of the Singapore International Energy Week, he said, "While the technology and supply chains are still nascent, momentum has picked up substantially in recent years. There is now a growing pipeline of production projects world-wide, and key technologies being trialled were expected to become commercially available in the coming years," he noted.



With land constraints and limited resources, the bulk of low-carbon hydrogen would likely have to come from imports. He noted that low-carbon hydrogen could also decarbonise sectors that cannot be easily electrified - for instance, hydrogen could be used as a feedstock in semiconductor plants and petrochemical processes.

“Besides lowering emissions, it also allows companies to produce sustainable products that could fetch a green premium,” he added. In addition, hydrogen could also be used to produce low-carbon fuels in the maritime and aviation sectors.

“To prepare for the deployment of hydrogen domestically and to build a hydrogen supply chain in Asia, Singapore will experiment with advanced hydrogen technologies that could soon be commercially ready. Research and development work will be furthered to advance these hydrogen technologies – with hydrogen as a key focal area of phase two of the Low-Carbon Energy Research Programme,” he added.

*The Straits Times/ANN, 25 October 2022*

## SINGAPORE SEEKS TO BOOST REGIONAL ELECTRICITY IMPORTS

Singapore will import more electricity from the region and is on track to reach its import target of up to four gigawatts of electricity by 2035, according to a Minister.

The city-state’s Energy Market Authority (EMA) has launched requests for proposals for electricity import projects from the region, said the Manpower Minister and Second Minister for Trade and Industry, during the Singapore International Energy Week conference. The EMA has since received more than 20 proposals from Australia, Indonesia, Laos, Malaysia and Thailand.

About 95% of Singapore’s electricity is generated from natural gas, although the country plans to ramp up sources of renewable energy. As Singapore transitions towards greater sustainability, there will be new growth opportunities in the areas of solar, energy storage systems (ESS) and smart grids, he said. “These opportunities include conventional and non-conventional solar deployment such as floating and building-integrated photovoltaics, battery ESS engineering, procurement and construction and project management services.”

During the energy summit, Singapore and Cambodia signed a Memorandum of Understanding to deepen energy cooperation.

Similar agreements were signed with Australia, Vietnam, Laos and Brunei during the year.

*Reuters, 26 October 2022*

## BIOGAS, BIOMETHANE COULD BOLSTER GREEN ECONOMY

Countries around the world are turning to biogas and biomethane to enhance their energy and food security and jump-start their circular economies.

In mid-October, Titan, a Netherlands-based independent supplier of low- and zero-carbon fuels, announced that it will build and operate the world’s largest biomethane liquefied natural gas export plant at the Port of Amsterdam, which is slated to come on-line in 2025.

The Titan-Bio Value project comes on the heels of the European Commission’s announcement in May that it will ramp up the EU’s biogas production from 3 billion cubic metres to 35 billion cubic metres by 2030.

The EU kicked off its biogas push earlier this month with the Biomethane Industrial Partnership, part of the REPowerEU plan launched in May as a strategy to end the EU’s dependence on Russian fossil fuels.

Europe and North America account for most of the current production of biogas and biomethane, and are home to some of the world’s largest producers of waste per capita, with Canada the largest producer in 2019 and the US the third largest.

With the global natural gas market having tightened in 2021, and the International Energy Agency (IEA) expecting this to remain the case into 2023, these countries are training their sights on biogas to address energy security.



The IEA estimates that the world could sustainably produce up to 730 million tonnes of oil equivalent (mtoe) of biomethane and cover 20% of global natural gas demand. As of 2018, it was producing 35 mtoe.

The Asia-Pacific region is seen as having the greatest scope for future biogas production, with production potential estimated at more than 200 mtoe as of 2018, according to the IEA, including roughly 80 mtoe from crop residue and 50 mtoe from animal manure.

*Oxford Business Group Column, Borneo Post, 06 November 2022*

## MHI, EGAT TO COLLABORATE ON CLEAN POWER GENERATION IN THAILAND

Mitsubishi Heavy Industries Ltd (MHI) and Thailand's largest power producer, Electricity Generating Authority of Thailand (EGAT), have signed a Memorandum of Understanding (MOU) to study and exchange information relating to clean power generation, hydrogen, carbon capture, utilisation and storage (CCUS) technologies in support of the nation's goal of achieving carbon neutrality by 2050.

Set to take place over the next three years, MHI, along with Mitsubishi Power, its power solutions brand, will exchange experiences and information on the specified areas with EGAT. This could also involve an exchange of engineers to share experiences and technical know-how on advancing cleaner power generation in Thailand.

"The MHI Group has played an instrumental role in Thailand's vibrant energy growth story for more than five decades," said Mitsubishi Heavy Industries (Thailand) President and Managing Director Ryo Takubo. "Looking ahead, we will continue to contribute our capabilities around world-class gas turbines, which are being developed to co-fire cleaner

fuels like hydrogen and ammonia, and CCUS technologies that are critical to lowering emissions.

Thidade Eiamsai, Deputy Governor of Power Plant Development and Renewable Energy, EGAT, reaffirmed the significance of the collaboration. "We've built a trusted relationship with Mitsubishi Power over the last few decades and believe that this agreement will combine both our technological expertise and understanding of local needs to facilitate Thailand's energy transition in accordance with the National Energy Plan," he added.

Mitsubishi Power started operations in Thailand in 1968 with the construction of the Queen Sirikit Dam together with EGAT.

*Borneo Post, 25 November 2022*

## SILICON VALLEY IS HOT ON NUCLEAR ENERGY

Venture capitalists in Silicon Valley and other tech hubs are investing money in nuclear energy for the first time in history which is changing its trajectory and pace of innovation.

"There's not been a resurgence of nuclear power, since its heyday in the late 1970s," Ray Rothrock, a long-time venture capitalist who has personal investments in 10 nuclear start-ups, told CNBC. Now, that's changing. "I have never seen this kind of investment before. Ever."

Jacob DeWitte, CEO of micro-reactor start-up Oklo, says the landscape has changed dramatically since he started raising money in 2014, when he was a part of the Y Combinator start-up incubator, which is an American technology start-up accelerator launched in March 2005.

"More investors are interested, more investors are excited by the space, and they're getting smarter to do the diligence and know what to do here — which is good," DeWitte told CNBC.

This surge of private investment will be a positive for the industry, agrees John Parsons, an economist and lecturer at the Massachusetts Institute of Technology (MIT). "I think having fresh perspectives is really good," he said. "Nuclear energy is a very complex science, and it's been supported by the Federal Government and at these national labs. And so that's a very small circle of people. And when you broaden that circle, you get a lot of new minds, different thinking, a variety of experiments."

In any industry, there can be a "groupthink" or "narrowness" in the way things are done over time, Parsons said. With private investment in the space, "there will be out-of-the-box thinking," he added. "Maybe that out-of-the-box thinking doesn't produce anything useful. Maybe it turns out that the old designs are the best. But I think it's really wonderful to have the variety of takes."

Not everyone is so optimistic that the recent influx of venture dollars will lead to progress.

Venture investors are hungry for returns, and this also spurs nuclear start-ups to chase multiple revenue streams as they're getting their big-bet technology up and running. But critics say venture capitalists are ignoring the troubled history of nuclear power as a business.

Ultimately, the new crop of nuclear start-ups has to figure out how to create nuclear energy in a cost-competitive way, or nothing else matters," says Rothrock. "The issue in nuclear is economics. Plants are complicated and take a while to build. Some of these new start-ups are tackling those issues making them more simple and thus cheaper. No one will buy an expensive power plant, especially a nuclear plant. Economics drives it all."

*CNBC, 02 December 2022*

# TOWARDS A CARBON NEUTRAL MALAYSIA 2050

*“I am committed towards making Malaysia a carbon-neutral nation as early as 2050,” announced the Prime Minister when tabling the 12th Malaysia Plan in Parliament on 27 September 2021.*

*“Although Malaysia contributes only 0.7% of global greenhouse gas emissions, the Government will continue its commitment to reduce greenhouse gas emission intensity of GDP by 45% by 2030,” he added. “To achieve this target, the Government will introduce various new measures, including a comprehensive National Energy Policy to provide long term strategic direction up to 2040.”*

*With this pledge, Malaysia joins the global coalition in the race for Net Zero Carbon Emissions 2050. It also puts the country ahead of its ASEAN neighbours. Indonesia’s carbon neutrality deadline is 2060, while Thailand has set it at 2065 to 2070. Singapore has announced that it would halve its 2030 peak greenhouse gas emissions by 2050, to achieve net zero emissions “as soon as viable” in the second half of the century.*

*Energy Malaysia examines the strategies and initiatives that are now in place or that are required to get Malaysia closer to realise this goal and emerge as a regional climate leader.*







Climate change is upon us and wreaking havoc across the world. It has revealed itself in floods, landslides, drought and famine that have grown in intensity and frequency. In Malaysia, once considered a safe-zone located outside of the Ring of Fire where earthquakes occur, is now being exposed to tectonic tremors and tsunamis. The social, economic and environmental costs of climate change are enormous, with lives lost or altered beyond repair.

Under the 12th Malaysia Plan that runs from 2021-2025, "Advancing Green Growth" has become the battle cry for the energy sector, which accounts for about 80% of Malaysia's greenhouse gas emissions according to the Energy Commission's Report on "Peninsular Malaysia Generation Development Plan 2020 (2021-2039)".

One of the strategic shifts announced by the Prime Minister when tabling the 12th Malaysia Plan was that the country will no longer build coal-fired power plants. The Jimah Power Plant, with the capacity of 2,000 MW, which started operations in 2019, will be the last new coal-fired plant in the country. "Cleaner electricity generation will be implemented through the operation of several gas power plants in Peninsular Malaysia, to replace coal-fired ones," he said.

He also announced that energy efficiency and conservation

legislation will be introduced to regulate electricity consumption by high intensity consumers in the industrial and commercial sectors. Also, economic instruments such as carbon pricing and carbon tax are to be implemented to lead the nation forward towards net zero emissions.

Other initiatives include the Green City Action Plan that targets 120 resilient green cities; intensifying producer responsibility to increase the implementation of sustainable production and consumption; as well as creating an eco-system for green investments. The Prime Minister added that details of carbon reduction measures will be announced when the low carbon long term development strategy study is finalised at the end of 2022.

Malaysia has made known its carbon neutral ambition internationally, at the United Nations Climate Change Conference of the Parties (COP26) held in Glasgow. Here, Malaysia upgraded its Nationally Determined Contributions (NDC) target to 45% by 2030 unconditionally, which previously stood at 35% by 2030 unconditionally, or 45% conditionally with assistance from third parties.

A year on, the Government unveiled the National Energy Policy covering the period 2022-2040, with several new low carbon economy initiatives and targets, in preparation of the leap into carbon neutrality as early as 2050.





# NATIONAL ENERGY POLICY 2022-2040

*THE NATIONAL ENERGY POLICY (NEP) 2022-2040 WAS LAUNCHED BY THE PRIME MINISTER ON 19 SEPTEMBER 2022*



Drafted by the Prime Minister's Department's Economic Planning Unit (EPU), which is also entrusted to monitor its implementation, the National Energy Policy (NEP) involved the collaboration of six other Ministries, including the Ministry of International Trade and Industry (MITI).

Described as a "comprehensive energy sector policy with a vision towards energy sustainability to achieve shared prosperity", the NEP has three objectives:

- Improve macroeconomic resilience and guarantee energy supply.
- Achieve social equity.
- Ensure environmental sustainability.

Resonating the Energy Trilemma, the NEP is also aligned to Malaysia's commitment to Sustainable Development Goal 7 (SDG7), that is, "to ensure access to affordable, reliable, sustainable and modern energy for all", which is "supported by today's global investment landscape that also emphasises environmental, social and governance (ESG) investing."

The NEP has identified 12 strategies and 31 action plans to achieve its goals, which will be implemented in line with the country's five-year plans. Its Low Carbon Aspiration 2040 has set the following targets:

- Energy efficiency of up to 11% for commercial and industrial consumers; and 10% by domestic consumers.
- 50% increase in the share of urban public transportation.
- 38% increase in the use of electric vehicles (EVs).
- Usage of 30% biodiesel (B30) mixture as an alternative fuel for heavy vehicles.
- Usage of 25% liquefied natural gas as an alternative fuel for marine transportation.

The Prime Minister stated that he will chair a newly-formed National Energy Council that will be created to ensure that the NEP initiatives are implemented effectively by the relevant Ministries and Agencies. He added that the NEP is a "living document" that will be updated every three years after a review by the Council in line with developments in technology as well as the country's socioeconomic level and energy needs.

He also added that the country's energy sector is about to "enter a new chapter" in line with the global emergence of new sectors such as low-carbon mobility through the use of EVs, as well as the generation and storage of new energy sources, such as hydrogen and bio-based energy. At the NEP launch, he announced that the Hydrogen Energy Masterplan was at the drafting process.

## A NATURAL PROGRESSION

Malaysia that has been pursuing the decarbonisation pathway for decades, since the term “sustainable development” in the Brundtland Report hit the global climate agenda in 1994.

After the first Earth Summit held in Rio de Janeiro in 1992, it pledged that the country will have 50% green cover to act as carbon sinks. Since then, various policies have been introduced to reduce emissions.

An important milestone was the Renewable Energy Act 2011 that saw the formation of the Sustainable Energy Development Authority (SEDA). One of SEDA’s first tasks was to catalyse renewable energy production with the implementation of the Feed-in-Tariff (FiT) mechanism. FiT aimed for biofuel generation by palm oil producers, using waste products. Besides promoting a circular economy built on the concept of waste-to-wealth, it highlighted the Government’s quest for renewable energy.

At the same time, a spate of other initiatives was introduced including an Amendment to the Electricity Regulations 1994 to promote energy efficient domestic appliances based on a star-rating system called Malaysia Energy Performance Standards (MEPS) devised by the Energy Commission. The Commission was also appointed to be the implementing authority for the Building Energy Intensity (BEI), a benchmarking tool to measure the energy performance of Government buildings. Also based on a star-rating system, BEI measures the intensity of energy used per square metre. A total of 100 Government buildings are targeted to become energy efficient under the BEI programme, with the private sector to follow suit.

Another landmark initiative prior to the 2015 Paris Agreement was the Green Technology Financing Scheme (GTFS), which KPMG describes as one of Malaysia’s strengths to achieve carbon neutrality by 2050.

GTFS is an outcome of the National Green Technology Policy launched



# WHAT IS CARBON NEUTRALITY?

*Carbon neutrality is a state when any carbon dioxide released into the atmosphere is balanced by an equivalent amount being removed. This can take place through carbon sequestration or offsetting.*

## CARBON SEQUESTRATION

Removing carbon oxide from the atmosphere and then storing it is known as carbon sequestration. The best way to sequester carbon is through carbon sinks. A carbon sink is any system that absorbs more carbon than it emits. The main natural carbon sinks are soil, forests and oceans. Carbon stored in natural sinks such as forests is released into the atmosphere through forest fires, changes in land use or logging. To date, artificial carbon sinks have not been able to remove carbon from the atmosphere on the necessary scale to fight global warming.

## CARBON OFFSETTING

One way to reduce emissions is to offset emissions made in one sector by reducing them somewhere else. This can be done through investment in renewable energy, energy efficiency or other clean, low-carbon technologies. The EU’s emissions trading system (ETS) is an example of a carbon offsetting system.

Another way to reduce emissions is the carbon border adjustment mechanism, which would apply carbon prices on imported goods from less climate ambitious countries. This should help discourage companies moving production from the EU to somewhere with less stringent greenhouse gas emissions rules.

*Source: European Parliament*

in 2009. It led to the formation of the Malaysian Green Technology Corporation (GreenTech) that was entrusted to administer GTFS, which was introduced in 2010.



*“GTFS offers a 60% guarantee of the financing amount and a rebate of 2% on the interest/profit rate charged by the financial institutions, to accelerate the expansion of green investments by providing easier access to financing from private and commercial financial institutions,” says the GreenTech website.*

As of May 2020, the Scheme had approved 349 projects with financing valued at RM4.5 billion or USD1.04 billion, noted the Greentech website. It added, "While the Scheme is open to projects from the energy, building, transport, waste and water and manufacturing sectors, the bulk of the projects approved were in the renewable energy sector. They accounted for more than 80% of the loans approved. The approved projects are anticipated to contribute to the avoidance of over 3.7 million tonnes of carbon dioxide equivalent every year."

The GTFS has brought together 29 banks and financial institutions to participate in the Scheme. With an increasing number of businesses venturing into the green technology sector, it is expected to be an important enabler in bridging financing gaps and empowering emerging green businesses in the country.

In 2019, Greentech was rebranded as Malaysian Green Technology and Climate Change Corporation and its portfolio expanded to include green advisory and capacity building; and green investment and promotion. It has since unveiled the third iteration of the successful GTFS (GTFS 3.0) to support Sustainable and Responsible Investment (SRI) as well as drive green and sustainable standards in Malaysia.

## POST PARIS AGREEMENT INITIATIVES

The 2015 Paris Agreement saw the Government intensifying national decarbonisation efforts. The 11th Malaysia Plan (2016-2020) that followed closely on the heels of the Paris Agreement reflected this commitment, by making "Advancing Green Growth" the anchor of the energy sector, the primary carbon emitter.

Subsequently, several catalyst projects took off. Among them was the Large-Scale Solar (LSS) Project, which saw the Commission being appointed as the implementation authority. This project is in accordance with the Government's intention to ensure that investments in RE will boost the national economy and benefit

the community. Solar energy was identified as the renewable energy of choice to take Malaysia to the next level; other renewable energy sources in the country are hydropower and biofuels. Initially, the Government's target was to have 25% renewable energy in the installed generation capacity by 2025. The target was raised to 31% at the end of 2021.

With rising demand for renewable energy-based electricity supply, in 2021 the Commission introduced Green Energy Tariffs (GET) where several large local companies and global multinationals had taken up the GET quotas allocated by the Commission.

*The Green Technology Financing Scheme has brought together 29 banks and financial institutions to participate in the Scheme.*

Besides improving planetary health, carbon neutrality has economic benefits. It is likely to open new business sectors and attract investment inflows from global corporations championing ESG-linked investments.

Every year, about 43% of climate finance (USD30.6 billion) flowing from developed to developing countries is channeled to Asia, says Dr Ryan Wong in an ISEAS-Yusof Ishak Institute report (October 2021). It is envisaged that by assuming the mantle of regional climate leadership, Malaysia can become an attractive destination for green investments, especially since its ambition matches that of advanced economies, many of whom have net zero carbon emissions deadlines between 2045 and 2050.

## PRIVATE MOVES

There are also various private initiatives on the ground. In 2020, Malaysia's state oil company Petrolim Nasional Berhad (PETRONAS) announced its aspiration to become a Net Zero Carbon Emissions (NZCE) company by 2050.

The oil & gas giant has made "clean energy" one of its primary business pillars, alongside its longstanding upstream and downstream businesses. It is also greening its operations and deploying innovative operations and technologies such as carbon capture and storage (CCS), among many other solutions. This has seen it forging partnerships with like-minded organisations.

In November 2021, PETRONAS signed a Memorandum of Understanding (MoU) with ExxonMobil Exploration and Production Malaysia Inc. to jointly explore opportunities in CCS technologies to help decarbonise Malaysia's upstream industry and provide carbon storage solutions for the region. Both parties will also assess the viability of potential CCS projects in designated offshore Peninsular Malaysia locations and identify suitable technology within the scope of carbon capture, transport and storage for potential applications.

In August 2022, PETRONAS signed another MoU, this time with Tenaga Nasional Berhad (TNB), which has also declared its NZCE 2050 aspiration. Under the MoU, PETRONAS and TNB will conduct a joint feasibility study on the application of CCS solutions at TNB power plants. They will also look at developing green hydrogen fuel for power generation and co-create a green hydrogen ecosystem to provide cleaner energy solutions in Malaysia and overseas markets.

Their first project is to re-power the retired Sultan Ismail Power Station in Paka, Terengganu by deploying green technology. The former combined cycle gas power plant will be given a new lease of life with the usage of high-efficient combined cycle gas turbine with hydrogen-ready technology by 2029.



From the investment perspective, the Employees Provident Fund (EPF) has announced its decision to have a fully ESG-compliant portfolio by 2030, and became a signatory of the UN Principles of Responsible Investment. This is expected to see more investments in ESG-linked companies that include those with net zero carbon emissions goals.

In the meantime, Bank Negara Malaysia has implemented initiatives such as the Climate Change and Principles-based Taxonomy (CCPT) and Value-based Intermediation guidelines (VBI) for the financial sector. CCPT aims to classify activities based on their impact on climate change and to steer financial flows towards activities that promote the transition to a low carbon economy. VBI aims to provide the outcomes of Islamic financing to generate positive and sustainable impact on the economy, community and environment.

Elsewhere, property development giant, Sunway Group, is pushing boundaries with its NZCE 2050 ambition. Besides committing to halve carbon emissions across the Group by 2030, the Group plans to introduce a carbon pricing framework into its business, to be the first Asian business entity to do so.

In an article entitled “Malaysia Among Asia’s Net Zero Champions” the ASEAN Post (20 May 2022) reports: “Sunway’s carbon pricing framework targets business divisions by placing a monetary value on carbon emissions they generate. This will guide their business decisions and investment strategies to meet the Group’s 2030 and 2050 targets.”

It adds, “An internal carbon pricing mechanism has been devised to meet the Group’s decarbonisation targets that have been set for each of its business units. For the period 2022-2024, the price is RM15 (USD3.55)/

tonne of carbon dioxide above a pre-defined threshold level, which will be recalibrated progressively in subsequent years.

“Business units that fail to meet their targets will need to pay a price by having an amount deducted from their business pool. By doing so, the Group hopes to have delivered a clear message to operators and managers that they need to start innovating to find solutions to cut emissions, or else pay a carbon price,” adds the article.

### **DETS: MALAYSIA’S CARBON TRADING SCHEME**

A Domestic Emissions Trading Scheme (DETS) is being developed by the Ministry of Environment and Water (KASA) to serve as a catalyst for the carbon trading sector, says a Bernama report (18 September 2021).

“State Government authorities and the private sector can leverage on DETS to execute carbon credit transactions at domestic levels,” said the Minister of KASA. He also added that DETS is capable of enhancing the capacity and reputation of private companies, including Government Linked Companies (GLCs), through environmental, social and governance (ESG).

DETS is designed to prepare industry players for the implementation of international trade carbon control mechanisms such as the Carbon Border Adjustment Mechanism (CBAM) by the European Union in 2023.

DETS will be implemented in phases, from the end of 2022. As a first step, a domestic carbon market platform has been developed for the implementation of a Voluntary Carbon Market (VCM), before the transition to the full-fledged DETS.

Bursa Malaysia was chosen to develop VCM and DETS because of its experience in implementing capital market operations such as equities and bonds,” said the Minister. “Bursa Malaysia also has the technical and legal capabilities to become the implementing entity for DETS,” he said.



The implementation of the DETS is based on the principles of an open market, as well as market supply and demand. This will facilitate access to the domestic carbon market by potential entities such as State Governments and private entities.

“Under VCM, State Governments and private sector involved must report information on their carbon projects to KASA,” added the Minister.

VCM is to serve as a source of reference for stakeholders keen to become involved in carbon credit transactions at the international level. It aims to ensure that the country’s interest in climate change reporting and commitment to reduce GHG emission is not compromised.

## CHALLENGES

In his analysis of Malaysia’s Carbon Neutral 2050 goal, Accenture’s Director of Energy Transition and Sustainability, Southeast Asia, Deven Chhaya points out that there are several challenges that Malaysia needs to tackle. “Perhaps the biggest issue is the gap in renewable electricity generation. A growing and urbanising population has seen demand for electricity rising substantially over the past decade, which is a trend that will continue.”

“More needs to be done to ramp up renewable energy capacity,” he adds. “Utilities will be expected to provide access not only to sustainable energy but also secure and reliable services to

minimise costly disruptions, given that nearly 80% of electricity consumption comes from the industrial and commercial sectors.


Equally important is the need to address issues such as cost and awareness for such solutions,” says Deven.

KPMG Malaysia’s Executive Director of Sustainability Advisory, Phang Oy Cheng, weighs in with: “Malaysia primarily uses coal and natural gas to generate electricity. The installed capacity of coal power plants forms approximately 40% of total capacity. The challenge is to decarbonise the energy-centric economy in the face of population growth and poverty outside of urban areas. The transition will require not only political will but also structural and legislative reforms on a national scale.”

Another challenge is winning over SMEs, who account for three quarters of Malaysia’s industrial output. “They need Government guidance and regulation to decarbonise,” adds Phang.

There has been some progress towards this green agenda with TNB stating that its Jimah Power Plant, commissioned in 2019, will be the last new coal-fired plant. TNB has pledged not to invest in any more greenfield coal-fired power plants.

Going carbon neutral is seeing the spotlight shining on key emitters such as energy, transportation, manufacturing, agriculture, water and waste management. At the end of the day, it calls for collective resolve and action. Everyone in Malaysia has to work at ensuring that every tonne of carbon produced is offset with an equivalent amount removed from the atmosphere.



*“A growing and urbanising population has seen demand for electricity rising substantially over the past decade, a trend that will continue.”*

# VOLUNTARY CARBON MARKET

## TAKES OFF END 2022

In a media statement issued on 15 August 2022, Bursa Malaysia Berhad (Bursa Malaysia) announced that it will be launching the Voluntary Carbon Market (VCM) exchange at the end of 2022.

The statement explained that the VCM exchange will enable companies to purchase voluntary carbon credits from climate friendly projects and solutions. "In line with the growing awareness of climate action, voluntary carbon markets play an important role to support financing for projects and solutions that reduce, remove or avoid GHG emissions," it added.

### How it works

*Bursa plans to offer standardised carbon credit products for trading via a rule-based VCM exchange. There will be distinct product categories for carbon credits derived from nature-based solutions and technologies that reduce or remove carbon emissions. Additionally, Bursa Malaysia will label products to differentiate between carbon credits sourced in Malaysia and globally.*

**B**y the end of 2022, a supply of carbon credits is to be sold by way of auction to interested buyers. The auction will enable price discovery for the new standardised carbon credit products that will be listed on the VCM exchange. The clearing price from the auction will establish a baseline demand for carbon credits in Malaysia, and will provide a reference point for secondary trading for market participants.

In addition, it will help provide clear price signals to support the development of domestic carbon credit projects. To achieve a lower carbon footprint over time, stakeholders can use these carbon credit products to voluntarily offset their existing climate impact alongside other internal carbon reduction initiatives.

To ensure the integrity of the VCM exchange, Bursa Malaysia will adopt the Verified Carbon Standard, better known as Verra. Verra is a widely recognised standard in the voluntary carbon market, accounting for nearly 70% of voluntary carbon credit issuances globally. Verra has developed transparent, credible and robust methodologies covering

a wide array of climate-friendly activities such as nature-based projects, methane avoidance or capture, sustainable agricultural land management, green mobility and others.

"Stakeholder engagement is the key in facilitating greater understanding among industry players to enable their participation in the VCM Exchange, especially in order to meet the ESG requirements of parties such as lending institutions," said Datuk Muhamad Umar Swift, Chief Executive Officer of Bursa Malaysia.

"With better understanding of carbon credit origination and listing processes, stakeholders will be able to develop capacities to be part of the carbon-credit supply chain. This will also help the industry to use the VCM to reduce their carbon footprint," he said.

"We believe that the VCM exchange can serve as an important lever to realise Malaysia's net zero GHG emissions aspiration, as well as support the private sector's voluntary climate commitments and decarbonisation journey," added Datuk Muhamad Umar Swift.



# HOME ROOFTOP SOLAR: A REALITY CHECK

*Rooftop solar power is hardly new. Photovoltaic (PV) panels on roofs have been around since the 1980s and their advantages are well known. The current thrust for renewable energy and concerted efforts from Governments globally to minimise carbon emissions has turned the spotlight on them.*

*Rooftop solar PVs have been shown to play a significant role in unlocking renewable energy production and consumption in Malaysia and across Southeast Asia. While industrial and commercial consumers are seizing opportunities from incentive schemes offered by Governments and reporting significant energy savings, Malaysian residential consumers remain on the side-lines. Energy Malaysia finds out why.*

**I**n Malaysia with a population of 34 million, the uptake of rooftop solar generation by residential properties is slow compared to some regional neighbours. EdgeProperty (8 October 2021) reported that of the 3.2 million landed residential properties in Malaysia, only about 1,000 have installed solar panels.

In comparison, Singapore with a population of 5.6 million achieved its target of 350 MW in April 2021, with rooftop solar photovoltaic systems on public housing as one of the main contributors. Rooftop installations in Vietnam topped 9.2 GW in 2020 but slowed down in 2021, while in the Philippines, the rooftop solar market is thriving due to the ease of obtaining permits.

However, there are less-than-stellar examples as well. Indonesia, with its incredible potential for solar energy, saw just 5.1 MW of solar power generated by residential solar PV installations in 2020, while Cambodia has quite a long way to go although solar energy was introduced there in 1997. These countries have long faced a myriad of challenges where supplying power to their respective populations is concerned.



# How the Solar Rooftop PV Works

## THE COMPONENTS

### 1. SOLAR PHOTOVOLTAIC ARRAY

A solar photovoltaic array consists of a number of solar PV panels that are electrically connected. The solar PV array generates direct current (DC) electricity from sunlight. It is important to keep in mind that photovoltaic systems must be installed on stable mounting structures that can withstand weather conditions like wind, rain and corrosion for the next few decades.

### 2. INVERTER

A solar power inverter is a key part of any solar photovoltaic system as it converts electricity from DC to Alternating Current (AC). This is necessary since you need AC power for the energy supply of home appliances.

### 3. UTILITY METER

Regardless of the rooftop solar PV system, a household will have a power meter that measures the electricity consumption. The utility meter is connected to the PV system and measures how much electricity is being used in the home. Unused or stored electricity generated by the PV panels can be fed back into the electric grid.

### 4. CHARGE CONTROLLER (OPTIONAL)

A charge controller is needed only when there is a battery bank. A charge controller measures whether batteries are fully charged, and can stop the current from flowing in order to prevent batteries from permanent damage.

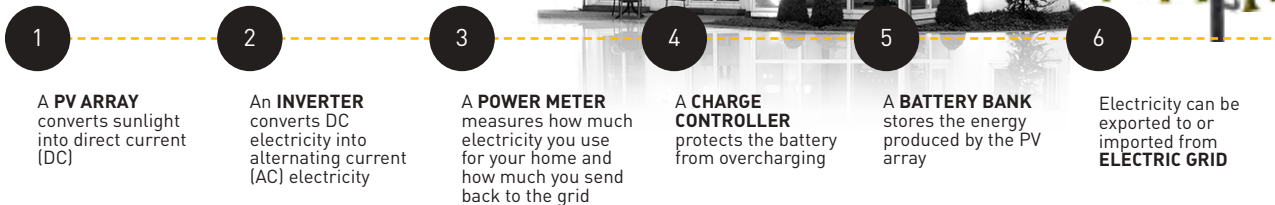
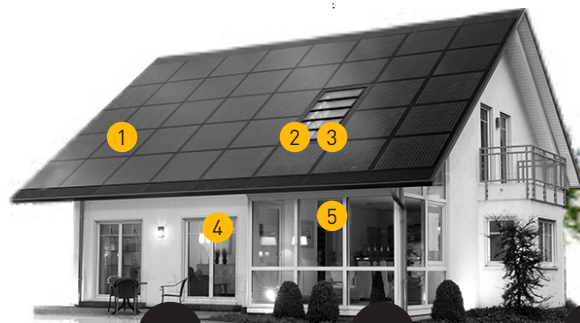
### 5. BATTERY BANK (OPTIONAL)

A battery bank makes sure that unused energy does not go to waste; it stores the energy produced by the PV array that is not consumed immediately. It can

then, for example, supply your home with electricity during the night or during very cloudy weather when there is insufficient sunlight. Including a battery bank in a photovoltaic system is optional.

### 6. ELECTRIC GRID

Although renewable technologies make living off-grid possible using solar battery solutions, most households have a combination of solar and grid-based electricity. When a home is connected to the electric grid, extra power generated once your battery bank is full can be sent to the grid. This also means that when the PV system is not adequate for your energy needs, you can use power from the electric grid.



Malaysia has been actively promoting rooftop solar generation since 2005, with various legislation and incentive schemes.

It began with the launch of the Building Integrated Photovoltaic (BIPV) programme in 2005 to increase the uptake of solar PV technology. Subsequently, the National Suria 1000 programme was introduced in 2007, to encourage the installation of solar PV systems in residential and commercial properties.

This was followed by the Renewable Energy Act 2011 and the Sustainable Energy Development Authority Act 2011 that introduced the Feed in Tariff (FIT) scheme, to purchase electricity generated from renewable resources at a fixed rate and period. FIT was well-received, particularly by palm oil estates and smallholdings because the mechanism is mainly for biogas, biomass and geothermal mini-hydro.

To increase the number of rooftop solar energy producers, the Net Energy Metering (NEM) was introduced in 2016, and it has undergone two reiterations – NEM 2.0 and NEM 3.0 – to attract more commercial and residential consumers.

Under NEM, a consumer installs a solar PV system on the rooftop primarily for self-consumption. Any excess energy generated is exported to the grid, and the value of the sale is offset by the value of electricity bought from the public utility, Tenaga Nasional Berhad (TNB).

In short, TNB electricity bill less solar energy sales = electricity bill to be paid

“NEM 3.0 that is currently in place is set to run until 2023,” says Ruzaida Daud, Head of Renewable Energy Capacity Procurement Unit at the Energy Commission. “Consumers are encouraged to install solar PV systems to hedge against the rising cost of electricity,” she adds.

Even then, solar panels remain a fairly rare sight on residential rooftops because many homeowners feel it's not worth it.

*It is estimated that when the monthly electricity bill exceeds RM400, installing a solar PV system may work out to be more cost-effective in the long run.*

Ir. Nirinder Singh,  
Managing Director, TNBX



#### A QUESTION OF COST

“I believe the price of solar PV systems is the main factor deterring Malaysian homeowners,” says Ir. Nirinder Singh, Managing Director of TNBX, the wholly-owned Tenaga Nasional Berhad subsidiary, which currently offers renewable energy solutions for homes and businesses. “In addition, TNB tariffs are among the lowest in Southeast Asia, so it doesn't create the urgency for homeowners to save on their electricity bills by installing solar PV systems.”

He also points out, “The bigger the size of the solar PV system, the more cost-efficient. Currently, a solar PV system costs between RM4,000 to RM5,000 per kilowatt peak (kWp), and includes the solar panel, inverter, other Balance of System (BOS) equipment, workmanship and after sales warranty offered by the service provider. Since the price of the solar PV system is considered to be relatively high, the payback period was fixed at 10 years under NEM 3.0.

“Savings, however, are more visible for customers with higher electricity bills that require bigger systems,” he explains. “True savings are best enjoyed when the payback period ends between five and seven years within the first 10-year period. After that, the consumer has to start considering reinvestment costs for battery storage.”

It is estimated that when the monthly electricity bill exceeds RM400, installing a solar PV system may work out to be more cost-effective in the long run. But even that may not happen.

“Under NEM 3.0 Rakyat category (for households), the one-to-one offset rate for excess energy exported to the national grid is applicable for 10 years,” says Ir. Nirinder. “After that, no excess energy will be transferred.”

He points out that homes generally use less energy during the day but that's when the solar PV system generates optimally. Battery storage (usually, an additional cost) is therefore required or else the energy produced is wasted and there are no real savings in electricity bills.

The Commission's Ruzaida says that savings on electricity bills and returns on investment differ from system to system. It also depends on the electricity consumed, rooftop space, installation capacity allowed, and capital expenditure incurred for installation.

She explains, “For example, a household with a monthly electricity bill of RM200, may save about RM123 on their bills based on a simple payback period of 10 years. But they have an upfront cost of RM14,000 for a 2.38 kWp installation. Homeowners in this category may not find any benefit in having a rooftop solar installation.”

To guide consumers on the viability of solar installations at their premises, the Sustainable Energy Development Agency (SEDA) has developed a calculator that can be found at <https://services.seda.gov.my/nemcalculator/#/calculator>

*(Ir. Nirinder Singh retired from TNBX in June 2022)*



## MORE NEEDED TO ENCOURAGE HOME INSTALLATIONS

Despite schemes such as FiT, NEM 2.0 and NEM 3.0, more can be done to boost rooftop solar PV installations in residential properties. Ir Nirinder suggests allowing larger size solar PV systems, particularly for households contending with high electricity bills. This will enable them to actually recover a higher percentage of their investment costs. Currently, home solar PV systems are subject to size limitations.

“In addition, the one-to-one offset rate for excess energy exported to the grid could be extended to 20 years, instead of the current 10 years,” he adds. “The 10-year limit prevents home owners from enjoying the sale of their solar energy; the current focus is on offsetting costs, not making a profit.”

Between 2020 and 2021, the COVID-19 pandemic slowed residential solar energy installations, primarily due to supply chain disruptions during lockdowns in various countries. Pandemic conditions caused delays in the manufacture and shipping of solar power-related equipment, impacting negatively on the market.

“The declining cost of solar PV systems owing to technology upgrades and market competition, together with supportive Government policies and incentives, are expected to drive future growth in our recovering economy,” he noted. “For example, there are plans to expand the Supply Agreement for Renewable Energy (SARE) to include the residential sector. Currently, it covers only the industrial, commercial and Government sectors.”

One of the key features of SARE is the Solar Leasing Concept to promote rooftop installations at zero upfront cost. Essentially, SARE is a tripartite agreement between the Investor (asset owner), Off Taker (consumer, with rooftop solar installation) and the Billing Agent (TNBX, which has the distribution infrastructure). The agreement typically spells out the tenure of the contract, tariff rate for the purchase of the solar energy from the Investor (known as Power Purchase Agreement – PPA – rate) as well as the terms and conditions for

*“The Commission’s role is to issue licences for installations and ensure the size of the system is safe and efficient.”*

- Ruzaida Daud, the Commission’s Head of Renewable Energy Capacity Procurement Unit



each party. The SARE mechanism is endorsed by the Energy Commission and Sustainable Energy Development Authority (SEDA).

Under the enhanced SARE, Ir. Nirinder says, “Households will need to pay the asset owner a fixed monthly sum for the solar energy produced by their rooftop systems. We expect this new payment arrangement based on a fixed monthly amount to be more attractive to solar PV investors and consumers. However, both are required to use TNB’s billing system because it facilitates the installation of solar PV systems with third party funding.”

The primary motivation of SARE is to accelerate the adoption of rooftop solar panels and create a generation of small-scale prosumers. Malaysia is one of the largest manufacturers of solar panels, but the market has hundreds of brands from different countries. Consumers can choose whatever system best suits their needs, budget and regulatory compliances.

## REGULATORY ENVIRONMENT AND FUTURE DIRECTION

“Solar panel prices are not regulated by the Commission,” says Ruzaida. “Our role is to issue licences for installation and the size of the system – it must be safe and efficient.”

Usually, solar panels last 25 to 30 years, and after this period their efficiency starts to decline significantly, with solar production output falling at 0.8% annually. This rate of decline is called solar panel degradation rate, and it varies according to the quality of manufacturing,” she adds.

The Government also has a range of incentives for solar prosumers, namely, the Green Investment Tax Allowance (GITA) and Green Income Tax Exemption (GITE) that have been extended to 2023.

GITA encourages prosumers to undertake green technology projects that have company or commercial benefits, provided they deliver green results. GITE is for those involved in providing services to support the implementation of green technology projects.

When presenting the 2021 Budget in November 2020, the Government announced the Green Technology Financing Scheme 3.0 (GTFS 3.0).

Ruzaida says GTFS 3.0 is a part of the Government’s agenda to support Sustainable and Responsible Investment (SRI), and a RM2 billion budget has been allocated for this purpose.



# ABOUT NET ENERGY METERING (NEM)

*The Government introduced the Net Energy Metering (NEM) scheme in November 2016 with a quota allocation of 500 MW for five years ending 2020, to encourage the uptake of renewable energy. The concept of NEM is that the energy produced from a solar PV installation will be consumed first, and any excess will be exported to TNB at the prevailing displaced cost.*

The NEM scheme is executed by the Ministry, regulated by the Energy Commission, with the Sustainable Energy Development Authority (SEDA) Malaysia as the implementing agency.

Due to a low uptake rate for NEM 1.0, the concept was revised, and NEM 2.0 was launched on 1 January 2019, when the principles of net energy metering was truly adopted.

NEM 2.0 provided for excess solar PV generated energy to be exported back to the grid on a “one-on-one” offset basis. As a result, the 500 MW quota under NEM 2.0 was fully subscribed by 31 December 2020. Most of the quota was taken up by commercial and industrial consumers, with minimal

participation from residential properties.

NEM 2.0 boosted Malaysia’s PV industry that saw a spike in sales of solar PV systems. Commercial and industrial customers found operational costs declining due to savings in electricity costs.

Encouraged, the Ministry introduced the new Net Energy Metering 3.0 programme (NEM 3.0) in December 2020 to expand solar PV installation.

### NEM 3.0

NEM 3.0 aims to provide more opportunities to electricity consumers to install solar PV systems on the roofs of their premises to save on their electricity bills. The NEM 3.0 will run from 2021 to 2023, and the total quota allocation is up to 800 MW.

It consists of three categories: Rakyat, Gomen and Nova.

	RAKYAT	GOMEN	NOVA
	Domestic	Government Buildings	Commercial, Industrial, Agriculture and Mining Buildings
Quota Allocation	100 MW	100 MW	600 MW
Mechanism (Roll-Over)	1:1 (12 Months)	1:1 (12 Months)	1:1 (12 Months)
Offer Period	Until 31 Dec 2023	Until 31 Dec 2023	Until 31 Dec 2023
Offset Rate	Prevailing Gazetted Energy Rate	Prevailing Gazetted Energy Rate	Average System Marginal price (SMP)
Offset Period	10 Years	10 Years	10 Years
Condition After 10 Years	Self-Consumption (SelCo)	Self-Consumption (SelCo)	Self-Consumption (SelCo)
Capacity Limit	Single Phase : 4 kWac Three Phase : 10 kWac	1 MWac	Net Offset : 4 kWac Net Offset Virtual Aggregation : 5 kWac
Eligibility	TNB Registered Consumer Under Domestic Tariff	Government Agencies Under Commercial Tariff	Non Domestic Account Holder

Source: Sustainable Energy Development Authority, Malaysia



# GLOBAL ROOFTOP SOLAR INSTALLATIONS TO ALMOST DOUBLE BY 2025

*Key drivers for the high uptake of rooftop solar PV in the residential sector include high retail electricity costs, low system costs, high FiTs and the available roof space, says Rystad Energy.*

Rooftop solar PV installations are set to surge in the next three years, with total capacity reaching 94.7 GW by 2025, reported theedgemarkets.com on March 15, 2022.

It cited Norway-based independent energy research and business intelligence company, Rystad Energy, as saying that the growth will continue a recent upward trend for the rooftop solar market, following relatively slow adoption from 2010 to 2016.

According to Rystad, rooftop installations had jumped by 64% in five years, rising from 36 GW in 2017 to 59 GW in 2021, and representing 30% of total global solar capacity. The firm said the growth was primarily driven by an increased adoption in China, where rooftop installations increased from 19.4 GW in 2017 to 27.3 GW in 2021.

It said before 2017, rooftop solar was almost non-existent in China, with only 4 GW of installed capacity in 2016. Rystad said the surge in rooftop capacity was mainly due to incentives and friendly policies introduced by many countries to promote adoption, especially Feed-in Tariffs (FiTs) that guarantee an above-market price for producers.

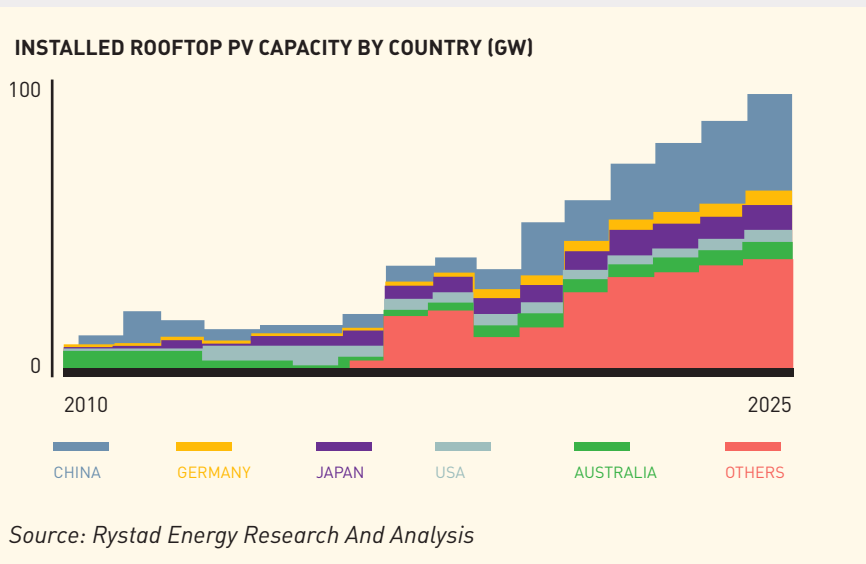
Rystad’s Head of Renewables Research, Gero Farruggio, said small-scale solar PV, including residential, commercial and industrial, and off-grid projects, are gaining momentum supported by economics and policies, with China, Japan, Germany, USA and Australia emerging as key markets.

“Key drivers of high uptake in the residential sector include high retail electricity costs, low system costs, high FiTs and the available roof space,” said Farruggio.

Rystad said Australia leads the world in per-capita rooftop PV installations with 746 Watts Direct Current (WDC) per person, followed by Germany with 668 WDC per person and Japan with

353 WDC per person. Australia, USA and the UK are only countries in the top 10 list for total installed rooftop capacity where most of the systems are dedicated to powering residential properties.

It said this is due to a combination of factors, including incentives (FiTs and grants), the high proportion of homeowners and the many rooftops with suitable space, as well as good solar resources (although this does not apply to the UK).





# NEW

## PATHWAYS & OPPORTUNITIES

Q&A With



**DAVE SIVAPRASAD**

Managing Director and Partner at Boston Consulting Group (BCG) Singapore ,  
Leader of the Climate & Sustainability Practice in South East Asia

*Renewable energy ambitions have created new business and investment opportunities around the world, and Malaysia is no exception. Renewables currently contribute 18% of Malaysia's energy mix. Malaysia's target is for 31% renewables by 2025. As such, the pace of capacity building has quickened particularly in the solar sector, which has been identified as the primary driver of future renewable energy efforts.*

**T**here is already a lot of interest in solar generation. When the Energy Commission rolled out the Large Scale Solar (LSS) programme in 2016, many new and established businesses entered the solar sector, keen to gain a foothold in an industry with immense growth potential not only in Malaysia but also other tropical countries. Under this programme, large scale solar farm owners can sell generated electricity back to the national grid for a period of 21 years.

The COVID-19 pandemic did not dampen interest. When the Government invited bids for the Large Scale LSS@MEnTARI in 2020, it received a total of 131 bidders, by far the highest number of bidders compared to 61 during the First Large Scale Solar Bidding Cycle (LSS1) in 2017, 106 bidders during the Second Large Scale Solar Bidding Cycle (LSS2) and 107 bidders during the Third Large Scale Solar Bidding Cycle (LSS3).

There are also opportunities in hydropower, which will continue to play a significant role in the renewable energy mix, especially in Sarawak. The state's 1,285 MW Baleh Hydroelectric Project, scheduled for completion in 2026, is a case in point.

Here, we talk to Dave Sivaprasad, Managing Director and Partner at Boston Consulting Group (BCG) Singapore and Leader of the Climate & Sustainability Practice in SEA, who shares with us current trends among green energy investors and new pathways, partnerships and opportunities that exist in Malaysia's renewables space. Dave is also a member of BCG's global climate leadership team and works with public and private sector clients on climate action and the energy transition.

**Q** What are the current trends in renewable energy production and consumption in the New Energy World?

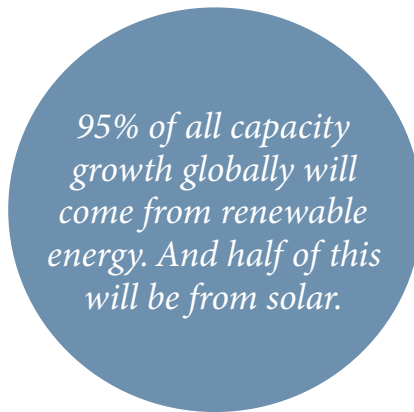
**DS** Renewable energy is growing rapidly around the world and attracting large amounts of investments from institutional investors, energy companies, power utility companies and other global and regional players. They are all investing to grow both domestically and internationally. Many have set aggressive targets.

There are also moves by oil and gas players to diversify their portfolios and increase their renewable energy capacity. They have also set very aggressive targets in the tens of gigawatts of capacity growth.

In terms of numbers, the latest International Energy Agency (IEA) report on renewable energy growth predicts that 95% of all capacity growth globally will come from renewable energy. And half of this will be from solar.

On the consumption side, conventional power generation still plays an important role in this energy transition. Gas is particularly important because it contributes the lowest carbon emissions compared to other fossil fuels. Even when more renewable energy enters the power mix, you will still need a stable base load of power to drive consistent energy generation. Currently, gas and coal play that role.

As innovation grows and the cost of storage drops, more renewables can be used in the system and provide a stable flow of power to consumers. However, conventional fossil fuels will continue to play a critical role in supporting the transition to low carbon power systems and a low carbon grid.



**Q** In Malaysia, what do you consider to be cost effective sources of renewable energy?

**DS** When we talk of renewable energy in Malaysia, it means hydro and solar. Hydro is very cost competitive when the country has this natural resource in abundance, and it accounts for about 80% of the country's renewables capacity now. Beyond hydro, solar is the most cost competitive source of renewable energy in Malaysia; since the country has no access to high wind speeds, the option for wind turbines is not at play. However, the solar power intensity varies by location. For example, in certain parts of the country such as in the northern part of Peninsular Malaysia, solar irradiation levels are higher, and it leads to better technical potential for solar power.

When looking at the competitiveness of solar power, one illustration is to look at the Large Scale Solar Feed-in-Tariffs (LSS FiT) implemented by the Energy Commission. From the first FiT in 2017 to the last FiTs in 2021, we've seen median prices dropping by more than 50%. This shows how competitive solar power is becoming when the technology becomes more efficient. It also means that there is more potential to scale. Solar is now a very competitive source of renewable energy in terms of cost efficiency.

**Q** Malaysia has shifted its target for renewable energy production in its capacity mix from 20% to 31% by 2025. Is this achievable?

**DS** In our various engagements and ongoing work in Malaysia, we believe this target is very achievable. Malaysia's ambition to increase its penetration of hydro and solar to around 30%-35% can be achieved.

There is also potential to go beyond this. But it calls for the careful management of power systems to cope with the increasing use of renewables. I think going beyond this target can be achieved with the combination of gas to compensate for the increasing need for innovation and cost reduction in long duration energy storage.

**Q** Do you expect new opportunities to be created with the revised target – more joint ventures or partnerships entering the market to scale up the country's green energy potential?

**DS** I think there are many opportunities to come in terms of new capacity additions, increasing investments in the space, new concepts and innovation in applications. A good example of that would be floating solar. Malaysia already has one of the largest floating solar farms in Southeast Asia, in the state of Kelantan. It has a capacity of 30 MW.

There will also be opportunities in combining sources of energy – for instance, combining solar with gas, solar with storage, and solar in off grid solutions.



**Q** Some top global companies such as Amazon and Google are investing in renewable energy. Why? And what kind of investments are involved?

**DS** Big companies are particularly interested because they all run data centres or have access to third parties who run data centres for them. As part of their net zero commitment to decarbonise, they want access to green power that runs 24/7 due to the high energy needs of their data centres. It is still technically challenging to have round-the-clock renewable energy as it is still dependent on when the sun shines and when the wind blows for the most part.

So, a lot of big tech companies, including in Malaysia, are looking at a combination of things. For example, they are looking at investments in energy storage and the potential of hydrogen to compensate when you don't have renewable energy generation. In order to scale, these companies are very focused on technical and business model innovation by partnering with other companies that have complementary technologies.

Other opportunities also exist for tech companies to partner with innovation funds that can finance more new technologies for commercialisation and bring more compelling approaches to the ecosystem.

**Q** Currently, what are the achievements of top performing renewable energy partnerships?

**DS** There are a lot of interesting concepts out there with various players in Malaysia announcing partnerships in the country. How successful they become really depends on the opportunities they are pursuing.

I would say that where these partnerships address a specific need, then the chances for success are quite high. For example, combining renewable energy with other sources to address the variability challenge with gas or hydrogen. Partnerships that find solutions for land constraints and pursue opportunities in floating or rooftop solar is also viable to get around some of these challenges. There are also some partnerships that may be looking to solve grid constraints with off grid solutions and renewable energy development that contributes to grid stability.

In any area where there's a need, and partnerships are addressing that need, then the chances of positive returns and success are much higher.

**Q** What should Malaysian companies look for when choosing a foreign renewable energy partner?

**DS** Ideally, it is always helpful to look for someone who has the technical capability and commitment to deploy investment and capital. But there is already a lot of technical capacity in Malaysia. So, it really is more about partnering for innovation in terms of how you would deploy it and innovation in coming up with new concepts and business models to serve the needs of energy systems in the transition. If partners bring new ideas and capabilities to these areas, it would be very valuable for the country.

**Q** What are the likely pitfalls of such partnerships?

**Any examples of fallouts – in Malaysia or elsewhere?**

**DS** In these partnerships, it is about bringing together complementary skills and capabilities – a big part of that is bringing the best of outside Malaysia experiences and capabilities and contextualising it to make it more applicable to Malaysia. When these partnerships work in harmony together, then they can become successful.

I really don't see any pitfalls to partnering for something as worthwhile as clean energy for a low carbon future. There have been business models that have worked well in Malaysia. The concepts around commercial and industrial rooftop solar projects have been successful. Government policies like the Green Energy Tariff (GET) and the lowering of bid costs for Large Scale Solar projects have also supported the green energy sector to make their innovations work well.



**Q** There is a lot of focus on investments in renewable production. What are the prevailing patterns in renewable energy distribution and consumption? What are the future possibilities?

**DS** The Malaysian Government has made some positive moves by offering broad incentives for renewable energy utilisation. They include the setting up of the Green Energy Tariff system, Net Energy Metering (NEM), self-consumption (SELCO), Supply Agreement of Renewable Energy (SARE) and Green Income Tax Exemption (GITE).

There is also increasing advocacy by constituents in the population, particularly about environmental and climate awareness. They want people to actively make choices. One of those choices is for consumers to know where they are getting their energy from. There are mechanisms in place for green energy that allow consumers to act on that need.

With the ambitions that Malaysia has set for renewable energy in the short to mid-term, we don't expect distribution costs to increase because it really is just pushing further the existing potential within the power system.

However, with renewable energy penetration increasing even further, there will be more investments needed for stability, storage, and other energy sources to complement and so on. On the flip side, the cost of these investments is also reducing. It is just a matter of time when these investments are made faster and implemented in the grid.

**Q** What would be the likely challenges for Malaysia to realise its renewable energy goals?

**DS** My sense is that Malaysia is well on track to reach its renewable energy goals. I think there is unlikely to be any risk of not meeting these goals.

When we go beyond these targets, to increase low carbon energy sources in the power system, then this is where it needs to be managed carefully – with base load versus variable sources; changing consumption patterns and pricing in different ways; investments in the grid and storage.

Part of the decarbonisation agenda for the country will also include electrification more broadly in other areas such as transport and so on. As electrification grows, the demand for power from the grid also grows. These would be some of the issues that will need to be managed in the longer term.

**Q** As renewables become a more prevalent source of power for everyone, do you expect people to become more conscious of energy savings?

**DS** In this aspect as well, the Malaysian Government has made positive moves by offering industrial and residential consumers with more choices. Having these choices coupled with more awareness and advocacy around this would promote the use of renewables.

The Government and consumers both play an important role in adopting the green approach to energy consumption. With the Government's announcement for Malaysia to become a carbon neutral economy by 2050, there will be a transformation in the economy and changes in consumer behaviour towards energy conservation.

I expect consumers to be playing an active role in realising this goal because they are being empowered with choices. They can make green choices that will conserve energy and lower their carbon footprint.



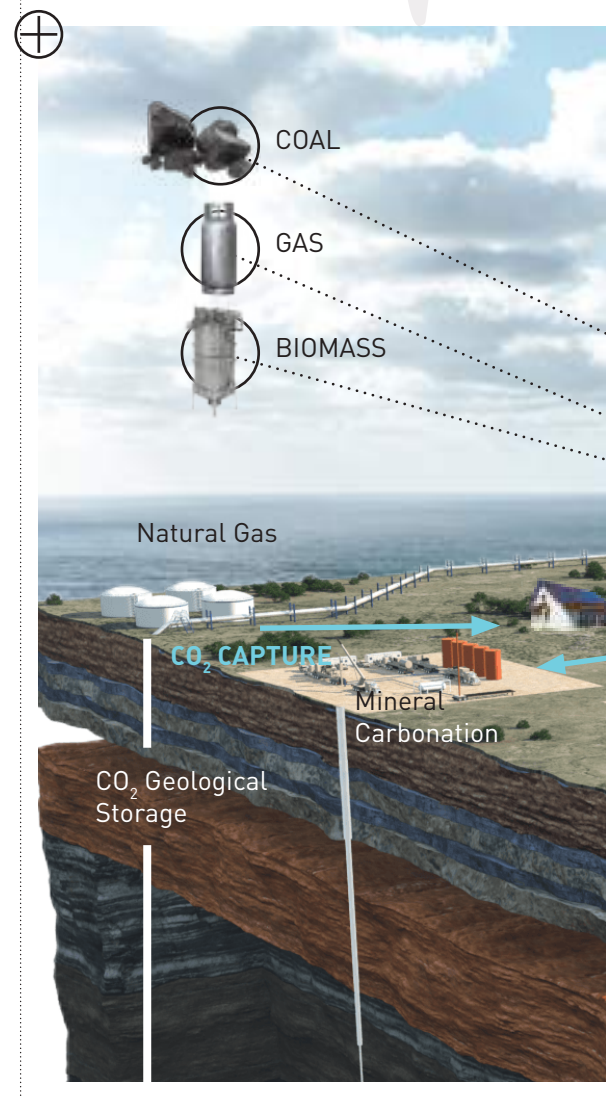
# KEEPING A LID ON EMISSIONS

*The Intergovernmental Panel on Climate Change (IPCC) has stressed that if the global community wants to achieve its Paris Agreement ambitions, it must limit future temperature increases to under 2° Celsius. This requires more than a reduction of emissions. The world needs to deploy technologies that work at removing carbon dioxide emissions from the atmosphere altogether.*

In this regard, Carbon Capture and Storage (CCS) and Carbon Capture Utilisation and Storage (CCUS) technologies have gained traction. As the name suggests, CCS is a process of capturing and storing carbon dioxide. The technology has the potential to capture up to 90% of carbon dioxide (CO<sub>2</sub>) released by burning fossil fuels in power generation and heavy industrial processes such as cement and steel production. Once the CO<sub>2</sub> has been captured, it is compressed into a liquid state and transported by pipeline, ship or road tanker. It can then be pumped underground at depths of one kilometre or more, to be stored in depleted oil and gas reservoirs, coalbeds or deep saline aquifers where the geology is suitable to store the gas.

The main methods of capturing CO<sub>2</sub> are pre-combustion, post-combustion and oxyfuel.

Pre-combustion processes are used before burning fossil fuels and involve converting the fuel into a mixture of hydrogen and CO<sub>2</sub>. Post-combustion processes remove it from the flue gases that result from burning fossil fuels. Oxyfuel technology produces CO<sub>2</sub> and steam by burning fossil fuels with almost pure oxygen. Post-combustion and oxyfuel equipment can usually be added to existing power stations or industrial plants even though they were originally built without it. However, pre-combustion methods require large modifications to existing plans to be retrofitted, and so are better suited to newly built facilities.



## LARGE-SCALE CCS PROJECTS

CCS has been around since 1972 in the USA, where several natural gas plants in Texas captured and stored more than 200 million tonnes of CO<sub>2</sub> underground.

According to the Global CCS Institute, there has been a rapid growth of CCS as countries strive to meet their climate goals. The Institute's 2022 report reveals a record high of 196 commercial CCS facilities. In 2022 alone, 61 new facilities were added to the project pipeline. It noted that the carbon capture capacity of CCS facilities under development has grown to 244 million tonnes per annum (Mtpa), which is an impressive growth of 44% from 169 Mtpa in 2021.

The first large-scale CCS project began operating in Sleipner, Norway in 1996. In the UK, as part of its Clean Growth Strategy, the Government has committed up to £100 million for the development of CCS technology.

Meanwhile, the Scottish Government has funded a feasibility study into CCS in the North Sea, while in Northeast England construction is underway to build a storage and transportation network to store CO<sub>2</sub> from across Europe, a project approved by the European Commission in 2017. The British Government has also pledged that by 2025, it will phase out coal plants that have not been fitted with CCS.

The Global CCS Institute says that the existing installations have the capacity

to capture about 31 million tonnes of CO<sub>2</sub> per year.

## THE POTENTIAL OF CCUS

While CCS technologies could contribute significantly towards lowering carbon emissions in the atmosphere by being stored out-of-breath in suitable geological formations, Carbon Capture Utilisation & Storage (CCUS) technologies have the potential of using the stored CO<sub>2</sub> in a wide range of applications.

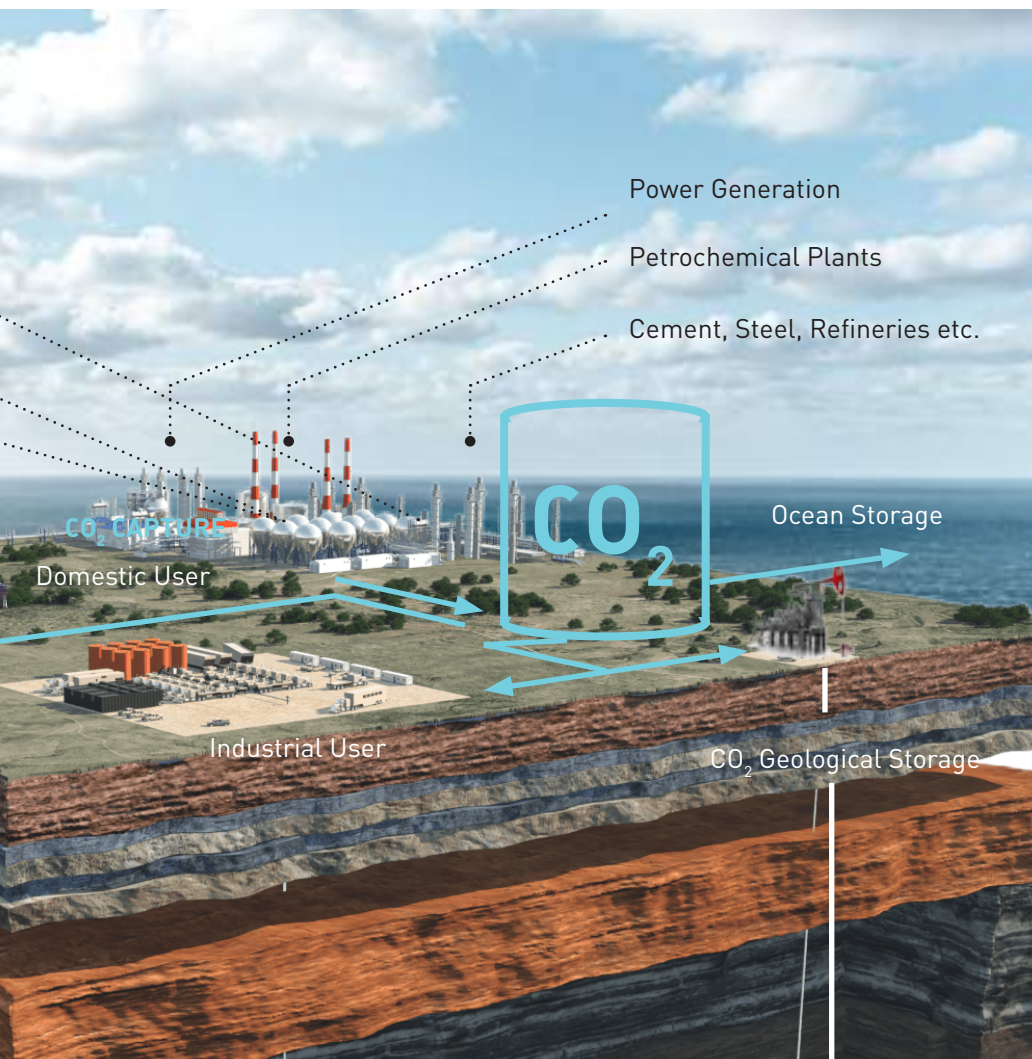
The most well-established form of CO<sub>2</sub> utilisation is in Enhanced Oil Recovery (EOR), where it is injected into oil and gas reservoirs to increase the extraction of these natural resources. Other potential forms of utilisation include converting the CO<sub>2</sub> into biomass by feeding the gas to algae, which are then harvested and processed into biofuel for transportation.

According to Julio Friedmann, a senior research scholar at Columbia University's Centre for Global Energy Policy, there are currently 20 CCUS projects operating around the world today. Every year, about 40 million tons of CO<sub>2</sub> are captured and stored in projects undertaken in the North Sea, Norway, the Middle East, Brazil, China and Australia.

After 15 to 20 years of research, geological assessment and testing, CCUS technologies have arrived to a level where conservative estimates put the global storage volume for CO<sub>2</sub> at between 10 and 20 trillion tonnes of capacity.

The International Energy Agency (IEA) notes that CCUS projects could reduce global carbon dioxide emissions by almost 20% and reduce the cost of battling the climate crisis by 70%.

One of the main reasons why CCUS are considered necessary is because heavy industries – power producers, steel mills, cement makers, fertiliser manufacturers – would find it expensive to adapt to run on cleaner energy sources.







# MALAYSIA'S CCS AMBITIONS

## MALAYSIA IS DEVELOPING ITS FIRST EVER LARGE-SCALE CCS PROJECT THAT IS TARGETED TO BECOME OPERATIONAL BY 2025.

The country's state-owned oil company, Petrolim Nasional Berhad (PETRONAS), is leading the Carigali Kasawari Phase 2 project in Sarawak, where extracted and compressed CO<sub>2</sub> will flow some 135 km by pipeline to the M1 field, to be offloaded into a depleted oil and gas reservoir. Kasawari will be the largest offshore CCS project in the world when it starts up, with 4 million tonnes of CO<sub>2</sub> to be captured annually. A total of 76 million tonnes of CO<sub>2</sub> from Kasawari will ultimately be stored in the M1 field.

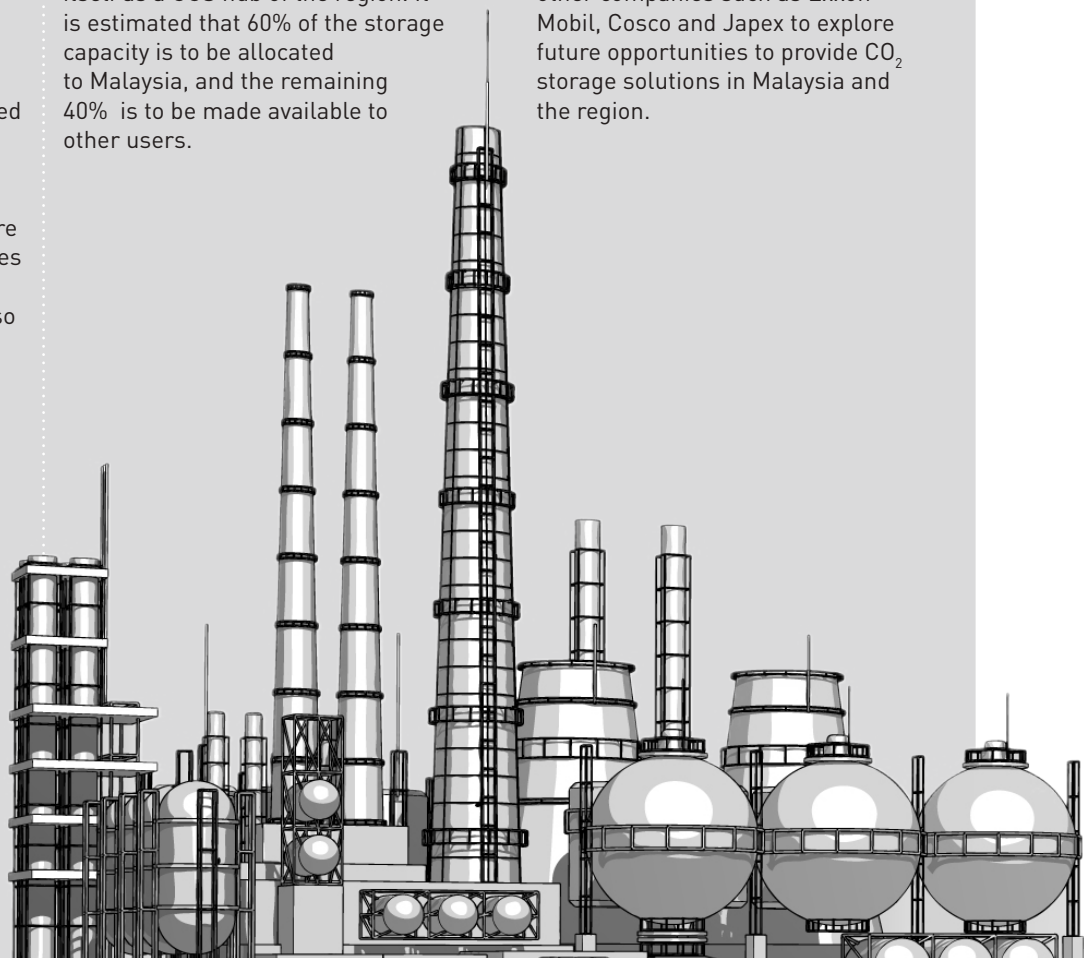
A second CCS project is on the cards, at the Lang Lebah offshore field in Sarawak that has reserves of 5 trillion cubic feet of gas. Besides CO<sub>2</sub>, this project will also capture hydrogen sulphide.

An estimated 46 trillion cubic feet of potential carbon storage capacity has been identified at 16 depleted fields across Malaysia. This is more than the country's forecast upstream CO<sub>2</sub> emissions. 11 of these potential sites are in offshore Sarawak, and five in offshore Peninsular Malaysia.

Malaysia also plans to make excess storage capacity available to third parties, and in so doing, establish itself as a CCS hub of the region. It is estimated that 60% of the storage capacity is to be allocated to Malaysia, and the remaining 40% is to be made available to other users.

To this end, PETRONAS and Shell signed a Joint Study Collaboration Agreement, particularly for a study to find suitable storage locations. This joint-venture will also enable the two companies to create CCS solutions that could help local and regional industries capture and safely store emissions as part of their decarbonisation efforts.

PETRONAS has also partnered with other companies such as Exxon Mobil, Cosco and Japex to explore future opportunities to provide CO<sub>2</sub> storage solutions in Malaysia and the region.



Another compelling reason for developing CCUS technologies is to unlock the potential of hydrogen. Hydrogen is a clean burning gas that could be used to replace fossil fuels in transportation, factories, even in air conditioning and heating systems. Hydrogen can be made by splitting water molecules into hydrogen and oxygen gases using renewable energy powered electrolyser machines. But this would be very costly. Instead, CO<sub>2</sub> captured and stored by heavy industries offers a more economically prudent alternative to producing hydrogen.

### CCS AND CLIMATE CHANGE

At present, CCS is the only technology that can help reduce emissions from large industrial installations. When combined with bio-energy technologies for power generation, CCS has the potential to generate 'negative emissions', removing them from the atmosphere. Many scientists and policymakers contend that this is crucial to limiting the world's temperature rise to under 2° Celsius.

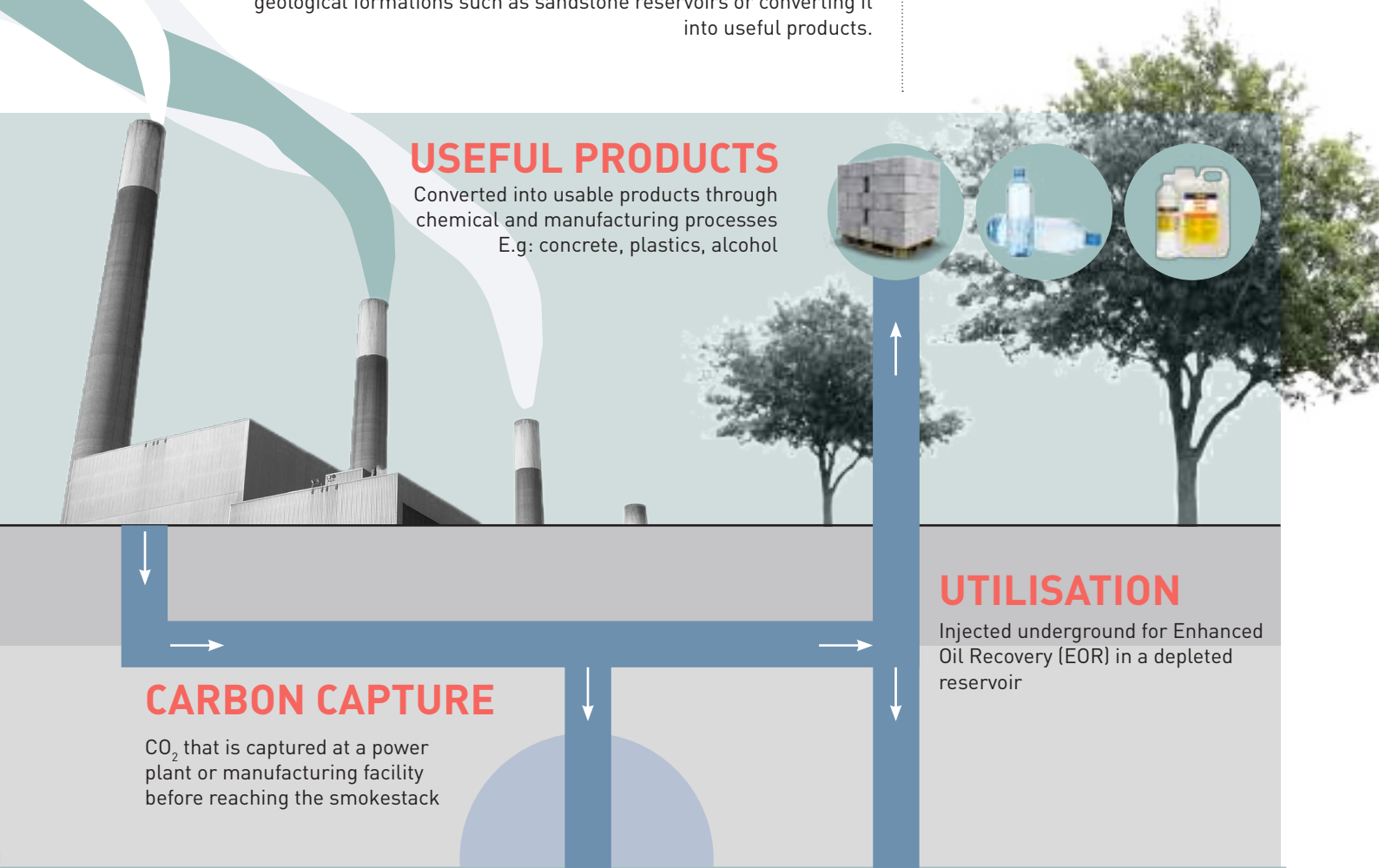
The IEA says that a tenfold increase in capacity is needed by 2025 for the global community to be on track to meet this target. In order to meet this goal, the Global CSS Institute estimates that the world would need 2,500 CSS facilities to be fully functioning by 2040, with each capturing around 1.5 million tonnes of CO<sub>2</sub> per year.

A major drawback of CCS is that the carbon capture process is expensive, due to high deployment and energy costs. A plant with CCS uses more fuel than one without, to extract, pump and compress the CO<sub>2</sub>. However, intensive research and development efforts underway to find ways to drastically reduce this cost.



## CARBON CAPTURE UTILISATION & STORAGE

CCUS are technologies and methods for preventing CO<sub>2</sub> from entering the atmosphere, by either safely injecting it deep underground in geological formations such as sandstone reservoirs or converting it into useful products.



# LARGE SCALE SOLAR IN MALAYSIA: WHERE ARE WE NOW?

*In 2021, Malaysia raised the share of renewable energy in its installed capacity mix from 20% to 31% in 2025, and 40% in 2035 under the renewable energy road map.*

*The push for clean energy is being largely driven by the national Large Scale Solar Program, which has already established 84 fast track solar farms between 2016 and 2021, with more planned in the future. We report here on the status of the Commission's LSS Program, and what are its strengths and setbacks.*

Solar technologies are the major driver of renewable energy uptake in tropical ASEAN. Installed solar capacity has expanded by 66% in the last decade, driven by regional large-scale solar (LSS) projects in recent years.

In Malaysia, with an ambitious climate goal that includes renewable energy making up 31% of the energy mix by 2025 and 40% by 2035, large-scale solar investments remain the most viable economic and environmental opportunity for the country and also is in line with the Government's intention to benefit the locals and boost the country's economy.







## REINFORCING THE POWER GRID

One of the biggest challenges of solar power is its intermittency, which affects energy security. Yet another is solar power integration – is the grid robust enough to ensure reliable supply?

These are among the issues deliberated by the Planning and Implementation Committee for Electricity Supply and Tariff (JPPPET) that conducts annual reviews of the **20-year Generation Development Plan (2021-2039)**, to formulate strategies and courses of action pertinent to prevailing trends and developments.

JPPPET was established in 1997 to plan, coordinate and identify electricity supply requirements to meet electricity demand. The Committee is chaired by the Minister and consists of representatives from relevant Ministries, Agencies and utility companies. As part of its regulatory role, the Commission advises JPPPET on all issues related to generation and the best possible projected outcomes, whilst taking into consideration the Energy Trilemma and the potential impact on consumers.

Among the current national priorities are the Energy Trilemma, on how Malaysia needs to balance trade-offs between:

- **ENERGY SECURITY** to enhance the reliability and efficiency of electricity supply to meet demand.
- **AFFORDABILITY** to ensure electricity supply is reasonably priced to benefit both consumers and producer.
- **ENVIRONMENTAL SUSTAINABILITY** to address carbon emissions in the power sector.

Renewable energy (RE) generation underscores environmental sustainability, and is spearheading Malaysia's decarbonisation agenda, alongside energy efficiency. Regarding RE, the Generation Development Plan focuses on variable RE (vRE), namely solar as the dominant source of RE in the system. It says it is imperative that intermittent generation from solar PV will not jeopardise the overall electricity supply system in providing uninterrupted and continuous power supply.

Hence, to effectively manage the integration of vRE with the projected supply and demand of electricity, the penetration limit for grid connected solar PV is set at 24% of the estimated peak demand. Such preventive measures are vital to safeguard the stability and security of the grid system without incurring any additional ad-hoc infrastructural costs for grid balancing and stability, arising from the excessive penetration of vRE. This, in the long run, will ensure affordable tariffs for all electricity consumers.

With the Government's goal for 30% solar penetration by 2039, grid expansion and enhancement with enablers such as energy storage systems are being explored. With more vRE from solar being integrated into the electricity supply system, there is a need to attain a full grasp of the underlying costs and technical requirements of having a higher share of vRE in the power system.

A study has been conducted to assess solar penetration limits and possible impacts on grid stability due to excessive supply of solar energy, in terms of infrastructure and associated costs. The findings are to be analysed and appropriate actions taken, to ensure continuous, reliable, and cost-effective electricity generation in a high-vRE penetration scenario.

Thus far, the integration infrastructure cost is estimated to be in the range of RM28.79 billion in 2021 to RM41.96 billion in 2030, and RM52.53 billion by 2039.

Large scale solar projects can accelerate the adoption of solar energy on a widespread commercial and industrial scale. The market for such projects is competitive as well as fragmented as indicated in the latest competitive bidding cycle conducted by the Large Scale Solar (LSS) Program. One of the attractions for bidders is the country's end-to-end solar PV value chain that offers important opportunities for investors and operators in the country's well established solar PV industry.

However, Malaysia is regarded as one of the most expensive solar markets in the Asia Pacific, behind Japan and Indonesia. This is because solar power producers here are also responsible for the cost of grid connection, which adds to their financial burden.

### LARGE SCALE SOLAR PROGRAM

The LSS Program was introduced under the 11th Malaysia Plan (2016-2020) to ramp up renewable energy production from solar, a readily available and no-cost renewable energy source in the country. The Government appointed the Energy Commission as the program implementing authority, to monitor the technical performance of LSS projects and their impact on the market. The Commission was also entrusted to conduct competitive bidding cycles to select technically and financially qualified companies to invest, build and distribute energy from solar farms to the grid.

Under the scheme, bidders / developers produce electricity at PV farms based on installed capacity awarded during the bid, and sell it to the grid. As at end 2021, there were 40 solar farms operating commercially, with a total installed energy capacity of 882 MW. With more projects underway, installed solar capacity is set to reach 4 GW by 2030. The target is for solar energy to make up 20% of the renewable energy mix by 2025.

This exponential increase will primarily be driven by large scale solar farms. Other solar energy producers in the country are small scale operators under the Government's Feed-in-Tariff, Net Energy Metering and self-consumption / prosumer initiatives. Other RE sources in Malaysia are hydro, bioenergy and new sources such as hydrogen.



A typical solar farm has a large number of solar PV panels that absorb the sun's energy, convert it into electricity and send it to the power grid for distribution and consumption. In terms of location and land mass, Malaysia is well endowed to accommodate large solar farms. It is estimated that a solar farm with a capacity of 1 MW will occupy between five and 10 acres of land. However, developers are bound by conditions to ensure they do not undermine existing economic activities or the environment.

"Our LSS projects are scattered all over Peninsular Malaysia and Sabah," says Ruzaida Daud, Head of Renewable Energy Procurement at the Commission. "Most project sites were originally agricultural and industrial land and water bodies. One of our requirements is that LSS plants are

to be developed on land with no other commercial use. Among the ideal sites are former landfills, disused mining land or vacant land with no economic activity.

"We are also stringent about site suitability. When poorly planned, solar farms can adversely affect rainfall and drainage, causing excessive water run-off and flooding. Since the development usually involves land clearing, we also monitor risks such as the loss of biodiversity and soil erosion. What is critical is to ensure our investors uphold environmental, social and governance (ESG) goals."

Grid integration is another responsibility to be borne by solar farm developers. Each solar farm needs to be connected at an appropriate voltage level of the utility power system. The interconnection point shall be at the cable termination of the incoming switchgear at the electricity utility company's switch room or switchyard where the cable supplying energy from the LSS plant terminates. "The distribution of power is to be at transmission or distribution levels, to serve various types of customers," adds Ruzaida.

"There has been a growing interest for green energy from big companies," notes Ruzaida. "It is part of their ESG requirements. The availability of green energy is also becoming an incentive to attract foreign direct investments," she adds.

In November 2021, the Commission introduced the Green Energy Tariff (GET) for consumers seeking to use green energy for their business. Effective 1 January, 2022, a total of 3,006 consumers have subscribed to GET, although the tariffs are higher than that for thermal energy supply. Electricity tariffs in Malaysia are determined by the Commission using the Incentive-Based Regulation (IBR) mechanism, a transparent system that

takes account of factors pertinent to producers and consumers, to arrive at a pricing structure that is equitable to both parties.

Ruzaida points out that solar energy tariffs will be higher than fossil fuel-based energy initially. “However, we expect green energy tariffs to decline over time, with technology improvements. As it stands, with each bidding cycle, we are already experiencing a significant reduction in generation costs, and this can be passed on to consumers in the form of lower tariffs. In the future, solar tariffs will depend on various factors such as construction costs that are likely to influence tariffs.”

### THE BIDDING CYCLES

By end 2021, the Commission had held four bidding cycles to award Large Scale Solar projects. They attracted more than 250 bidders, both from Malaysia and overseas.

“The participation of foreign companies depends on the policy of each bidding cycle,” says Ruzaida. “When permitted, foreign companies are required to form a consortium with one or more local companies and their consortium equity interest cannot exceed 49%,” she adds. The fourth bidding cycle LSS@MEhTARI was restricted to Malaysian companies only in efforts to stimulate the country’s economy following the COVID-19 outbreak.”

The four bidding cycles have resulted in the award of 84 large scale solar projects. The total solar capacity to be delivered by them is 2,196 MW, or 17% of the national RE target for 2025. Successful bidders included fossil fuel producers, utility companies and solar PV manufacturers.

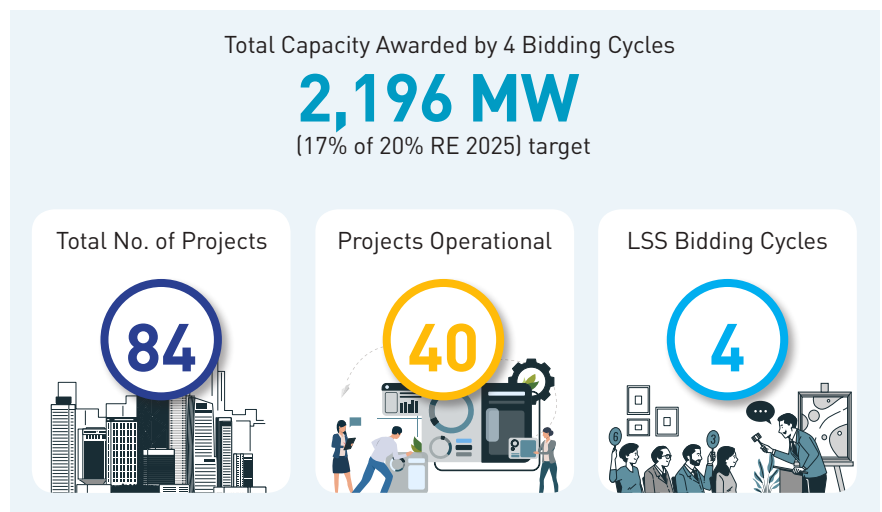
Ruzaida notes, “We are attracting large established companies who have a history in conventional fuels and are now diversifying into clean energy. There are also solar technology companies, with plenty of know-how and promise.”

“The Government offers incentives in terms of financing, tariffs and trading to investors, who are usually the bidders / project developers. Today, 40 solar farms are operational, while the rest are in different stages of construction,” says Ruzaida. “

In terms of capacity, the solar farms range from 1 MW to 100 MW. A 30 MW LSS plant, for example, can generate up to 53,000 MWh annually. However, generation can decrease over time due to the depreciation of solar PV panel’s efficiency,” she points out.

Since the LSS Program began in 2016, project costs have become more competitive,” says Ruzaida. “It has declined from 41 sen to 21 sen per kWh in average,” she adds. “This is an advantage when it comes to green tariff setting. With the reduction of project costs, including PV module manufacture, solar farm developers can pass on the savings in the form of lower tariffs to consumers.”

“We also expect costs to decline with the adoption of new technologies and the growth of a pool of experienced Malaysians, with the expertise to build and operate large scale solar farms.”



### LSS AT A GLANCE

	Bidding Cycle	Capacity Awarded	Farms in Operation (capacity)	Scheduled Year of Operation
2016	LSS 1	371 MW	354 MW	2017-2020
2017-2018	LSS 2	511 MW	366 MW	2021
2019	LSS 3	491 MW	391 MW	2022
2020-2021	LSS@MEhTARI	823 MW	-	2023





# CHINA'S ROAD TO CLEAN ENERGY

## “Where is China in its CLEAN ENERGY journey now?”

**I**t started in 2005, when the Renewable Energy Law came into force, and the pace has quickened in recent years. In 2021, the International Energy Agency (IEA) referred to China as “a clean energy powerhouse, and has played a leading role in many of the world’s success stories to date.”

China is the world’s hungriest consumer of energy due to rapid industrialisation, rural-urban migration and its large population of 1.4 billion. In 2019, oil demand stood at 3.3 billion tonnes, and since 2011, it has burnt more coal than all other countries combined. Its reliance on fossil fuel adds up, and China emits the largest share of greenhouse gases in the world.

On the flip side, China is also the world’s most prolific producer of wind energy, with the capacity to make more than twice as much as the second-largest generator, the United States of America. It has about one-third of the world’s solar-generation capacity, and as at 2019, was building more systems than any other country.

### BUILDING RENEWABLE ENERGY CAPACITY

As a huge consumer and producer of energy, China can help the world move nearer to achieving global climate goals. Given its role as a world leader in various industries, it is responsible for one-third of all carbon emissions globally. Just its steel and cement industries alone emit more carbon dioxide than the EU’s total carbon emissions, says IEA in a report entitled “An Energy Sector Roadmap to Carbon Neutrality in China” released on 29 September 2021.

When China’s Renewable Energy Law took effect in 2005, there was an upsurge in renewable energy capacity. It saw wind capacity installation increase by more than two-fold annually from 2006-2008. Following the historic 2016 Paris Agreement, China joined the global community to reduce emissions, and committed itself to increasing the proportion of non-fossil energy in primary energy consumption to 20% by 2030.

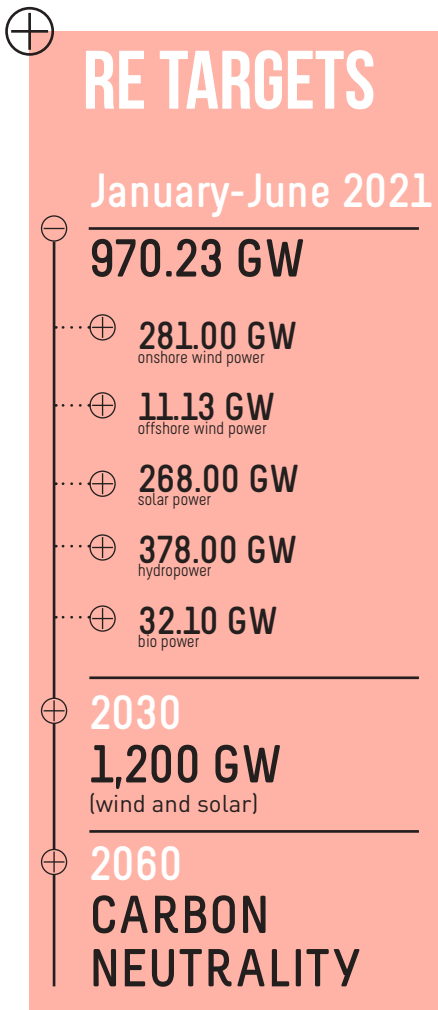
This Intended Nationally Determined Contribution was reflected in its 13th Renewable Energy Development Five Year Plan (2016-2020), which established targets for renewable energy deployment until 2020. Accordingly, strategic pathways were laid to improve energy efficiency, expand the stable of renewables such as wind and solar / photovoltaic panels, and reduce coal usage.

In the publication Project Syndicate (21 August 2017) released by the McKinsey Global Institute, Jonathan Woetzel and Jiang Kejun wrote, “At the start of 2017, China announced that it would invest \$360 billion in renewable energy by 2020 and scrap plans to build 85 coal-fired power plants. In March, Chinese authorities reported that the country was already exceeding official targets for energy efficiency, carbon intensity, and the share of clean energy sources. And just last month, China’s energy regulator, the National Energy Administration, rolled out new measures to reduce the country’s dependence on coal.”

The report also observed that China is “at the centre of a global energy transformation that is being driven by technological change and the falling cost of renewables”.

China now has new targets. Its capacity of wind and solar power is to be raised to over 1200 GW – the equivalent of the US’s needs – by 2030, when China hopes to achieve peak carbon emissions. Its aspiration is for carbon neutrality by 2060.

In the first half of 2021, renewable energy generation capacity increased by 4%, to 971 GW. This was made up of 281 GW onshore wind power; 11.13 GW offshore wind power; 268 GW solar power; 378 GW hydropower; and 32.1 GW bio power. China’s National Energy Administration plans to replace coal – now used for 58% of China’s power generation – with renewable energy.



Renewable energy sources will be dominated by wind and solar, which will eventually account for more than 85% of the country’s total energy mix by 2060. To bring all these plans to fruition, China needs to connect its sources of renewable energy with the areas that need them the most, especially the megacities on the eastern seaboard. This will need a national network of ultra-high voltage (UHV) power lines that is estimated to take 30 years to establish, at a cost of approximately US\$300 billion. As of now, China has 30 fully-functioning UHV transmission lines.

### REDUCING POLLUTION

Fossil fuel-based generation and consumption is a major contributor to pollution in the country. Seven of the 10 most polluted cities in the world are in China. Air pollution alone is estimated to have cost China US\$535 billion in 2012 or 6.5% of its GDP, due to losses in labour productivity. Air pollution reportedly also contributes almost 1.6 million deaths annually, or about 17% of all deaths nationwide. Life expectancy too has declined, by as much as five years in some areas.

While developing low cost solar and wind energy to replace fossil fuel energy has become its core strategy to reduce air pollution, China is also advancing with innovative technologies such as hydrogen and carbon capture to diversify its clean energy sources.

In the September 2021 report, IEA Executive Director, Fatih Birol described China as “a clean energy powerhouse and has played a leading role in many of the world’s success stories to date, from solar power to electric vehicles.” He added, “Its ambition for carbon neutrality will result in even greater flourishing across a wider array of low-carbon technologies and a significant decline in fossil fuel use in the coming decades.”

For now, China has to tackle emissions from existing fossil fuel-based power plants, steel mills, cement kilns and other industrial facilities, which in the past three or four decades have earned China the reputation of being the

world’s factory. They are the country’s primary job and wealth creators, and combined with mass rural-urban migration, have turned China into a polluted, power-hungry nation.

Like with many industrialised or industrialising nations, the challenge is to balance economic priorities with health and environmental concerns. By making renewable energy a cost-efficient, reliable and viable alternative, China is preparing for the big switch to clean energy.

### TECHNOLOGY SOLUTIONS

Technology improves the stability of renewable energy, say researchers. It also makes power stations more efficient, thereby reducing costs. With the Chinese Government planning to reduce subsidies to companies in the renewable energy industry, firms that run “green” power plants are moving concertedly to acquire or develop technology that will increase output and decrease production costs.

China is also actively pursuing the development of battery technologies. This is critical because electricity generated by renewable sources such as wind and solar are not as consistent as that generated by fossil-fuel plants. The amount of sun and wind can be variable and unpredictable, made worse by climate change. This intermittency tends to make the grid unstable. In addition, researchers have also pointed out that it is more difficult to merge solar and wind power with the existing electricity grid.

Another obstacle is logistics. In 2017, more than 30% of the renewable power produced in the sunny, windy areas of Xinjiang and Gansu in northwest China was never used because it couldn’t be distributed to areas that needed it most, namely, megacities such as Shanghai and Beijing, which are thousands of kilometres away.

This spurred the Chinese Government to start investing billions in high voltage transmission lines such as the 22.6 billion yuan (US\$3.2 billion), 1,600-kilometre line from Qinghai in northwest China to the province of Henan in central China. Storage

capacity has also been increased, with the use of batteries that can store excess power and release it whenever power is required. Other options are pumped-storage hydroelectricity and thermal storage.

In 2017, China introduced the National Policy on Energy Storage that emphasises the need to develop cheaper, safer batteries with larger holding capacity, to increase the amount of power that can be stored. These batteries include the lithium-ion type, which can be used in electric vehicles, and large-scale, stationary, integrated wind and solar power battery systems. Developing battery technology for electric vehicles, particularly, is vital as this will reduce pollution.

Another project, in the city of Dalian in Liaoning province, involves vanadium flow batteries, rechargeable devices that store liquid electrolyte in huge tanks. Vanadium batteries may have an edge over lithium-ion for large-scale applications like power grids. The vanadium electrolyte can be scaled up more cheaply and is less likely to catch fire. These batteries also have a lifespan approximately 10 times that of lithium-ion batteries. When completed in 2023, the Dalian project is to provide an 800 MWh energy storage facility.

Substantial grants have also been given for research into heat-storage capacity for use in solar thermal power plants. Solar thermal power plants generate power from the heat of the sun rather than from its light, as photovoltaic or solar panels do.

Local Governments have jumped onto the battery storage bandwagon because the battery manufacturing industry enjoys Government support. This has also spurred commercial interest in battery technologies. Since 2012, research funding for energy storage, electric vehicles and related technologies has been increasing.

China is also aware of the need to catch up with the level of renewable energy expertise available in Europe and the USA. At the same time, it wants to ensure its tariffs are low by Western standards so that its industries are competitive in world markets. Energy tariffs are set by Local Governments with the approval of the Energy Bureau in the National Development and Reform Commission, the oversight body of the country's macroeconomic policy.

### EXPANDING UHV TRANSMISSION NETWORKS

While fossil fuels can be transported to and generated by power stations close to urban centres, the same cannot be said for wind and solar. These renewable energy sources are best harvested in wide open spaces and transmitted over long distances to population centres, via ultra-high voltage (UHV) transmission lines. The higher the voltage, the less power is lost in transmission.

Currently, there are UHV lines supplying power to Beijing, Chongqing and Jiangsu, from the outlying provinces of Qinghai (northwest), Xinjiang (northeast) and Yunnan (far southwest). They carry the output of 10 power plants, many of them still coal-fired facilities.

In Qinghai, the dry, windy, bright and sparsely populated conditions are ideal for wind and solar energy generation. It has a 600 km<sup>2</sup> facility, roughly the size of Singapore, that generates about 18.7 GW of electricity that is enough to power double of what New Zealand needs.

According to the Government's renewable energy roadmap, new cross-province power lines will transmit at least 50% renewable energy power. The construction of these power lines is to be undertaken by two companies: the Government-owned State Grid and the China Southern Power Grid Co, both Fortune Global 500 companies.

These generation and transmission networks will also open up far flung regions of China that have not been able to fully benefit from the country's economic development.

### MULTIPLIER EFFECTS

The shift to clean energy has other multiplier effects, especially job creation. The National Energy Administration's plan to spend more than US\$360 billion developing renewable energy is expected to create millions of jobs.

### ONGOING BATTERY TECHNOLOGY PROJECTS



#### VANADIUM FLOW BATTERIES

- Power grids and other large scale applications

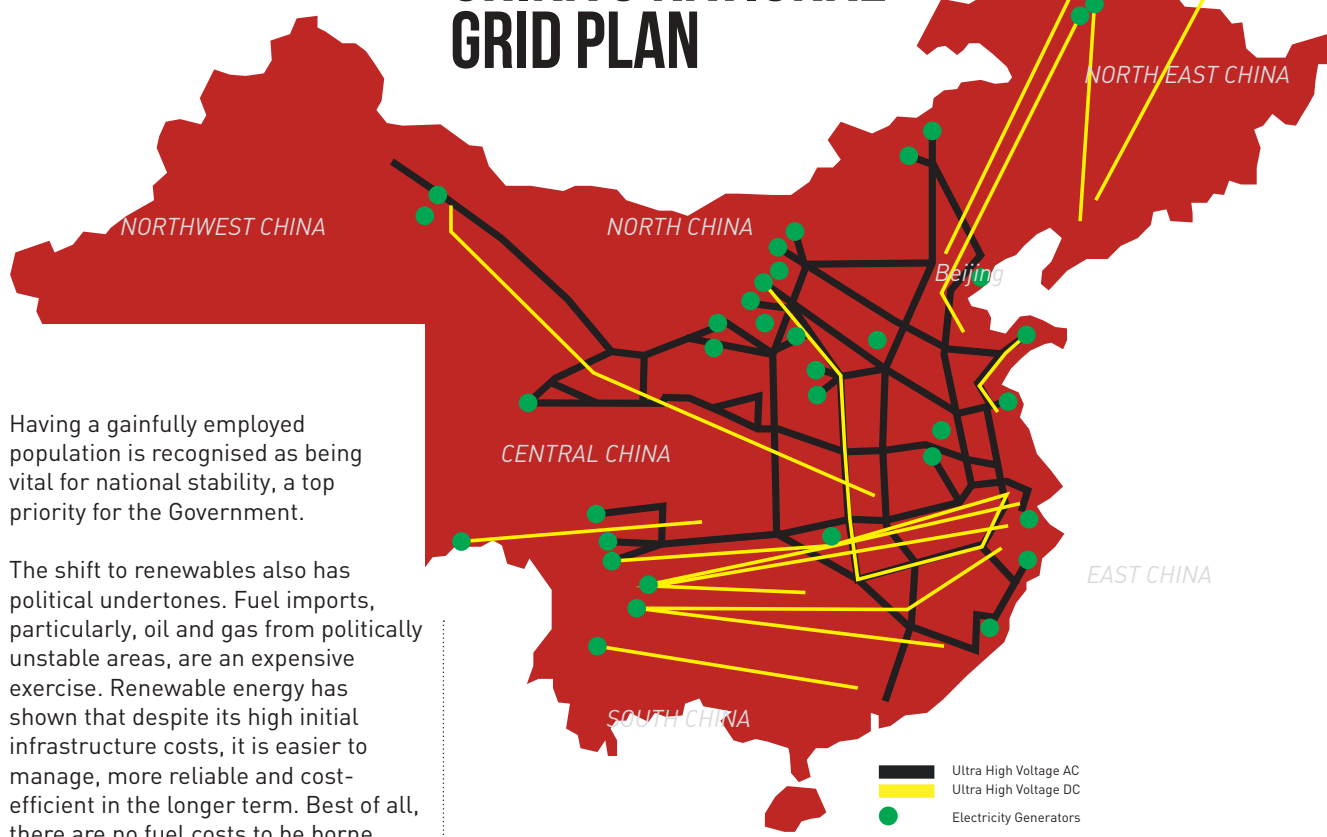
#### LITHIUM-ION BATTERIES

- Electric vehicles
- Wind and solar power systems





# CHINA'S NATIONAL GRID PLAN



Having a gainfully employed population is recognised as being vital for national stability, a top priority for the Government.

The shift to renewables also has political undertones. Fuel imports, particularly, oil and gas from politically unstable areas, are an expensive exercise. Renewable energy has shown that despite its high initial infrastructure costs, it is easier to manage, more reliable and cost-efficient in the longer term. Best of all, there are no fuel costs to be borne.

It also means not having to deploy military strategies to ensure fuel imports are met. A case in point is the 2017 construction of a naval base in Djibouti, to protect oil transit 'choke points' that could threaten the country's fuel supply.

China is also positioning itself as an attractive Foreign Direct Investment (FDI) destination for renewable energy technologies, allowing foreign investors to establish wholly foreign-owned companies in the country. Chinese companies importing wind, hydroelectric, geothermal and solar-related technologies and equipment also qualify for a range of incentives.

For FDIs, the attraction in China is the technological advances being made in the renewable energy sector. They recognise that R&D collaborations can help spread costs and risks. The European Union, for one, is already

- Ultra High Voltage AC corridors connecting North and Central Grids
- Ultra High Voltage AC synchronous grid interconnecting North, Central and East Grids
- Ultra High Voltage DC transfer long distance power
- Expected capacity of UHV: above 200 GW

Source: State Grid Corporation of China

forging alliances with China that will be mutually beneficial in the global transition to clean energy.

China's clean energy capabilities are also set to play a pivotal role in the country's green growth. The IEA believes that China has the political will, economic capability and moral consensus needed to lead the global renewable energy sector.

At the United Nations General Assembly in 2021, President Xi Jinping stated that China will stop building coal power plants overseas. China watchers regard this as a positive step coming from China, which is known for building massive infrastructure projects (including power projects) in emerging and developing economies under its Belt and Road Initiative.

# MALAYSIA'S ENERGY POLICIES THROUGH THE YEARS

*Malaysia's energy policies were initially shaped by nation-building priorities. The focus was on energy security to transform the country from an agrarian to an industrialised economy while ensuring equity based on affordability and access – of making electricity a basic right of every household.*

*Although the first National Energy Policy of 1979 stressed on environmental protection, energy security dominated energy-related policies for the rest of the 20th century.*

*By the 21st century, there were growing concerns over climate change and global warming. As a signatory to various international agreements on climate change, Malaysia has commitments to uphold, and they have shaped energy policies accordingly. These policies also worked at strengthening the governance of the energy industry, so that it is more competitive, resilient, and comparable to those in advanced economies.*

*Energy Malaysia takes a look at the policies over the years and their impact on the ground.*

In 1978, Malaysia established the Ministry of Energy, Telecommunications and Posts. The inclusion of "Energy" in the portfolio was "somewhat misleading", recollected Tan Sri Leo Moggie, who was then the Energy Minister, because the responsibility of the Ministry did not cover the oil and gas industry – it came directly under the Prime Minister, who had oversight for the national oil company Petroliaam Nasional Berhad (PETRONAS) that was established in 1974.

In fact, Malaysia's first National Energy Policy came into effect in 1979, after the 1975 National Petroleum Policy that laid the foundation for the efficient utilisation of indigenous petroleum resources.

Since the colonial years to 1981, power generation in Malaysia was based on three fuels, namely, hydro-power, coal and oil.

By then, the world had experienced the 1973 OPEC oil embargo led by Saudi Arabia, and the 1979 Iranian Revolution was ongoing. Both caused serious fuel shortages and a surge in oil prices, dealing severe blows on oil-dependent industries such as power generation, manufacturing and transportation.

Against this backdrop of volatile oil prices that could enrich and weaken economies in turns, Malaysia framed its 1979 National Energy Policy. It was a well-considered policy developed in the interest of energy security and equity, and mindful of environmental protection. In short, it met the Energy Trilemma dimensions as they are known today.

The National Energy Policy made electricity supply infrastructure a priority, to reach the wider population with rural electrification and connectivity to the power grid. It also focused on delivering power at affordable prices.

In the years that followed, various energy-related policies such as the Fuel Depletion and Four-and Five-Fuel Policies were implemented. Their emphasis was on energy security.

Even when the 1992 Rio Earth Summit jolted the world with the realities of climate change and global warming, sustainable energy did not gather momentum as a global force. In fact, Malaysia's Five Fuel Policy introduced renewable energy in 2002 for energy security rather than for environmental reasons.

The international climate lobby, however, remained vociferous, clamouring for global action because climate knows no borders. Multilateral Agencies such as the United Nations were concerned with what they saw on the ground.

It led to the 1997 Kyoto Protocol that was ratified by a larger part of the global community including Malaysia. Although it came into force in 2006, many signatories had moved ahead to integrate environmental sustainability into their development plans. In Malaysia, the 2002 National Policy on the Environment provided this direction.



# OVERSIGHT FOR OIL AND GAS

Offshore oil exploration in Malaysia started in the late 1960s. The country's promising oil & gas reserves spurred the Government to centralise regulatory and ownership rights from the states and negotiate new contracts with oil producers. The establishment of PETRONAS through the Petroleum Development Act, 1974 reflected the spirit of the time.

Today, as the custodian of the nation's oil and gas resources with full regulatory powers, PETRONAS dominates the country's energy sector and determines the conditions of entry by other parties through closed bidding, selecting which areas are for exploration and under what fiscal terms.

Participation in the extraction of oil and gas in Malaysia requires parties to enter production sharing contracts, joint operating or farm-out agreements with PETRONAS. A PETRONAS licence is also required to operate a business to process or refine petroleum, or to market or distribute petroleum or petrochemical products.

In Sarawak, the State Government has developed a regulatory role in gas distribution via the state-owned oil and gas exploration company, Petroleum Sarawak Berhad (PETROS) that was established in August 2017. In February 2020, PETROS took over full control of natural gas supply, sales and distribution network in Sarawak from PETRONAS.

## 21st CENTURY SHIFTS

Two significant developments influenced the energy industry in the 2000s. One, is the growth of unconventional oil & gas production (in a process colloquially known as "fracking") that saw an influx of fossil fuels entering the marketplace. Two, is the growth of renewable energy sources, recognised as key to limiting greenhouse gas (GHG) emissions.

Malaysia is rich in conventional energy resources such as oil and gas, and is a net energy exporter. Crude oil, liquefied natural gas and petroleum products contributed RM156,665 million, 15.6% of the economy's export earnings in 2018.

Malaysia is also blessed with abundant renewable energy sources such as hydropower, biomass and solar. In 2018, hydropower, biomass, biogas and solar combined to contribute 6,643 ktoe out of the total 99,873 ktoe of primary energy supply (by fuel type) for the year.

The key is to strike the right balance between indigenous fossil fuels and renewable resources to produce energy at affordable prices. From 2006, Malaysia introduced a spate of policies to promote sustainable energy.

At the same time, there were calls for industry reforms, and it led to the New Energy Policy in 2010. Its highlight was the implementation of the Malaysia Energy Supply Industry (MESI 1.0) reforms, for better management of energy pricing, supply, efficiency, governance and change management.

Today, the 2016 Paris Agreement plays a definitive role in Malaysia's energy environment. Malaysia's Nationally Determined Contribution has shifted from the initial 35% reduction of GHG emissions by 2030 unconditionally and an additional 10% with global aid, to 45% unconditionally. As the leading contributors of GHG emissions, the energy industry is under intense pressure to reduce its share of pollution.

The policies thus far have borne promising results. According to the World Economic Forum's Energy Transition Index 2021, Malaysia ranked 39th globally among 115 countries as being ready for the energy transition.

With the National Energy Policy (2022-2040) in place, Malaysia has identified steps to be taken to move forward to become a low carbon economy by 2040, the stepping stone for carbon neutrality as early as 2050.



### MALAYSIA ENERGY POLICIES 1975-2022

Prior to the launch of National Energy Policy (2022-2040), the Government had introduced wide-ranging policies that resonated the Energy Trilemma dimensions.



POLICY	OBJECTIVES AND HIGHLIGHTS	ENERGY TRILEMMA FOCUS
<p><b>National Petroleum Policy (1975)</b></p>	<p>To ensure efficient utilisation of indigenous petroleum resources to facilitate national industrial and economic development, and to ensure effective regulation and national majority control in the ownership, management and operation of the oil and gas industry.</p>	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<p><b>National Energy Policy (1979)</b></p>	<p>Main policy governing energy sector in Malaysia to achieve efficient, secure and environmentally sustainable supply of energy:</p> <ul style="list-style-type: none"> <li>• Supply: To ensure adequate, secure and cost-effective energy supply.</li> <li>• Utilisation: To promote efficient utilisation of energy and discourage wasteful and non-productive patterns of energy consumption.</li> <li>• Environment: To minimize negative impact of energy production, transportation, conversion, utilisation and consumption to the environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<p><b>National Depletion Policy (1980)</b></p>	<p>To prolong the lifespan of national oil and gas reserves by safeguarding against over-exploitation and prioritising domestic needs for future energy security, with production caps imposed on oil and subsequently on natural gas reserves.</p>	<ul style="list-style-type: none"> <li>• Energy Security</li> </ul>
<p><b>Four-Fuel Diversification Policy (1981)</b></p>	<p>To enhance reliability and security of energy supply by reducing over-dependence on oil as the single fuel source by diversification to four main fuels: oil, gas, hydroelectric and coal.</p>	<ul style="list-style-type: none"> <li>• Energy Security</li> </ul>
<p><b>Five-Fuel Diversification Policy (2000)</b></p>	<p>To introduce renewable energy as an alternative fuel source to complement existing four focus fuel sources identified in the Four Fuel Diversification Policy, and to encourage efficient energy utilisation.</p>	<ul style="list-style-type: none"> <li>• Energy Security</li> </ul>

<b>National Policy on the Environment (2002)</b>	To promote continuous economic, social and cultural progress and enhancement of quality of life for Malaysians through environmentally sound and sustainability development, including stewardship of environment and continuous improvement of environment quality, and sustainable use of natural resources, and patterns of consumption and production.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Biofuel Policy (2006)</b>	To promote the use of biofuels, in alignment with the Five-Fuel Diversification policy, as an environmentally friendly, sustainable and viable source of energy in order to reduce the dependency on fossil fuels and to promote the well-being of all stakeholders in the agriculture and commodity based industries through stable and remunerative prices.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Green Technology Policy (2009)</b>	To promote energy efficiency whilst enhancing economic development, to facilitate growth of Green Technology industry, to increase national capability and capacity in Green Technology development, to ensure sustainable development and conservation of environment for future generations and to enhance public awareness on Green Technology.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Policy on Climate Change (2010)</b>	To promote effective management of resources and enhanced environmental conservation to strengthen economic competitiveness and improve quality of life, to integrate climate change considerations into national policies, and to strengthen institutional and implementation capacity to address challenges and opportunities from climate change.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Renewable Energy Policy and Action Plan (2010)</b>	To enhance utilisation of indigenous renewable energy resources to contribute towards national supply security and sustainable socio-economic development by increasing RE contribution in national power generation mix, to facilitate growth of RE industry, to ensure reasonable RE generation costs, to conserve environment for future generations and to enhance awareness on role and importance of RE.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>New Energy Policy (2010)</b>	To promote energy security, economic efficiency and environmental and social considerations, with increased energy source diversification, through increased energy efficiency, gradual reduction of energy subsidies and achieving market pricing. Five key pillars of the New Energy Policy are energy pricing, energy supply, energy efficiency, governance and change management.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Energy Efficiency Action Plan (2015)</b>	To enhance energy efficiency with target of 8% reduction in energy demand compared to baseline with energy efficiency initiatives, enabled by the implementation of the Energy Efficiency plan, the strengthening of institutional framework and capability development, sustainable funding mechanism and promotion of private sector investment into energy efficiency initiatives.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>Nationally Determined Contribution (2016)</b>	To decrease GHG emissions intensity of GDP unconditionally by 35% in 2030 vs. 2005 levels and a further 10% on condition of receipt of climate finance, technology transfer and capacity building from developed countries.	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>
<b>National Energy Policy 2022-2040</b>	To realise Malaysia's Low Carbon Aspiration 2040 targets. (More details on page 12)	<ul style="list-style-type: none"> <li>• Energy Equity</li> <li>• Energy Security</li> <li>• Environmental Sustainability</li> </ul>

# ON THE GROUND IMPACT

## HIGHLIGHTS



The policies listed in the previous pages established strategic directions and pathways to enhance Malaysia's ranking in the global Energy Trilemma. They were also formulated to ensure effective stewardship, conservation and utilisation of indigenous energy resources, as well as to promote end-user energy efficiency.

On the ground, these policies were translated into various initiatives to make the Malaysian energy industry world class, and have the strength and resilience to manage the fluid global energy ecosystem.

### IMPROVING REGULATORY STRUCTURE AND REFORMS

The evolution of policies saw the development and restructuring of organisational and regulatory roles for better governance.

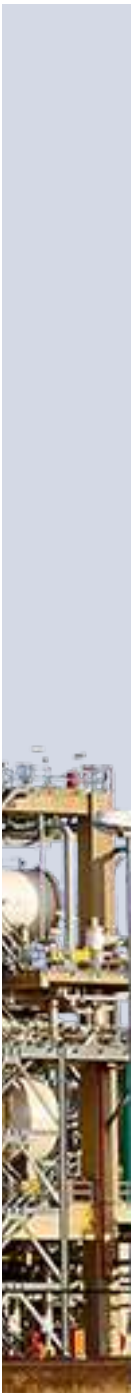
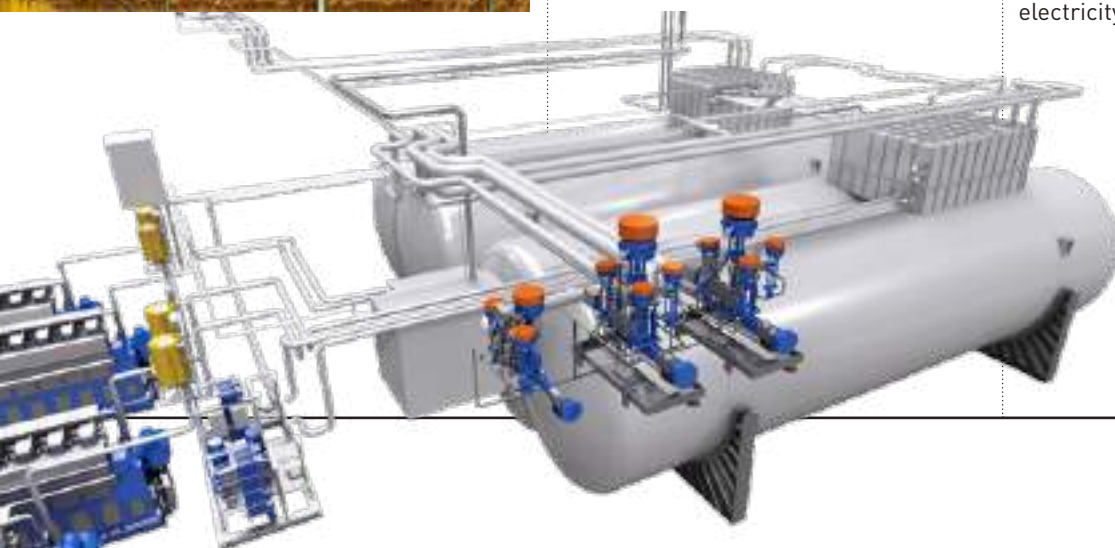
One of the milestones during this period was the establishment of the Energy Commission in 2001. Until then, there were various regulatory

authorities overseeing different aspects of the energy industry. The Government decided to centralise regulatory functions pertaining to electricity and piped gas supply, which are recognised as the backbone of the economy and an indicator of the standard of living.

This saw the Energy Commission taking over the role and functions of the Department of Electricity and Department of Gas and becoming the regulatory authority for the electricity and piped gas supply industry in Peninsular Malaysia and Sabah. Electricity and gas supply in Sarawak is regulated by State Agencies.

Besides being a regulator, the Energy Commission also advises the Minister in charge of energy on policies relating to electricity and gas supply. It also works in close cooperation with the Sustainable Energy Development Authority of Malaysia (SEDA), established in the wake of the National Energy Policy on Climate Change and National Renewable Energy Policy and Action Plan in 2011. SEDA is a statutory body formed under the Sustainable Energy Development Authority Act 2011 to promote sustainable energy in the country.

The Government also embarked on the structural reform of the electricity supply industry, with the implementation of Malaysian Electricity Supply Industry (MESI 1.0) from 2010-2014. Among its milestones was the implementation of the Incentive Based Regulation (IBR), a transparent tariff-setting mechanism to ensure fair and affordable tariffs as part of energy equity. As of 2022, Malaysia has among the lowest electricity tariffs in ASEAN.





## LIBERALISATION OF THE ENERGY MARKET

Prior to the 1990s, Tenaga Nasional Berhad (TNB) had a monopoly over the generation, transmission and distribution of electricity. With rapid economic growth and rising demand for electricity, the Government decided to privatise generation in the interest of energy security. In 1993, it awarded the first Independent Power Producer (IPP) licence to YTL Power Generation Sdn. Bhd.

Since then, the country's electricity generation market has been gradually liberalised. Besides the entry of IPPs, it saw the implementation of the Single Buyer model for electricity procurement. Under this model, IPPs and the power generation arm of TNB sold their power to the Single Buyer, an autonomous unit based in TNB in Peninsular Malaysia; at Sarawak Energy in Sarawak, and at SESB in Sabah. The sale price of power is regulated by the Government through the Energy Commission.

Another milestone was the launch of the New Enhanced Dispatch Arrangement (NEDA) to improve cost-efficiency among producers in the Single Buyer market. This scheme permits IPPs to supply power to the National Grid without entering into Power Purchase Agreements. Instead, NEDA requires power producers to bid daily at variable operating rates, according to the rules set by the Energy Commission. In May 2019, NEDA was updated to include solar power producers.

## RENEWABLE ENERGY – GOING GREEN

Malaysia's renewable energy target is 31% of the capacity mix by 2025 and 40% by 2035. Currently, renewable energy accounts for 18% of the energy mix, and this is made up mainly by 86% of hydropower.

In the meantime, the Government, through the Ministry, has also pledged to increase power generation from renewable energy sources in its Electricity Supply Generation Development Plan 2021-2039.



*The launch of Green Energy Tariff in November 2021, where several multinationals and big Malaysian corporates pledged to become green energy consumers.*

Solar was identified as the renewable energy with the highest potential in Malaysia. In June 2021, the Minister of Energy and Natural Resources announced that the country intends to introduce better energy storage systems (among the stumbling blocks in the development of solar energy), with a total capacity of 500 MW from 2030 to 2034. These battery energy storage systems will enable the storage of excess energy generated by solar panels for later use. The Energy Commission is also conducting a study on the potential of building a Battery Energy Storage System (BESS) which will be concluded by the end of 2022.

To boost solar energy development, the Energy Commission introduced the Large Scale Solar (LSS) Program from 2016 to 2020. The first three cycles of LSS had capacities of between 370 MW to 500 MW. The fourth cycle for 1 GW was launched in May 2020, to attract more development in solar energy, particularly by local players.

In November 2021, the Energy Commission launched the Green Electricity Tariff (GET) scheme to promote renewable energy consumption. It attracted interest among big corporations who have pledged to pay a premium for green power to meet their energy

consumption needs. Among the Government customers are the Ministry, Energy Commission, SEDA and MyPower Corp.

With the growing case for renewable energy in the world today, several traditional energy players are also participating in this field. They include PETRONAS Gas Berhad, which is exploring opportunities for cogeneration plants. Parent company PETRONAS, meanwhile, has set up a clean energy solutions unit as part of a global operational shuffle and targeting for net zero carbon emissions by 2050.

The other big player in Malaysia's energy market, TNB, is aiming for net zero emissions by 2050, in line with the Government's policy. The public utility plans to invest RM22 billion from 2022 to 2024 under the IBR framework, to develop the smart grid as an enabler for Malaysia's energy transition. The smart grid will facilitate wider consumption of renewable energy in the future.

When delivering the 12th Malaysia Plan (2021-2025), the Prime Minister stated that Malaysia will not construct new coal power plants. He added there will be more non-hydropower renewables in the system to meet the power demand of the future.

The Government introduced the Net Energy Metering (NEM) scheme in 2016 to encourage the uptake of renewable energy (RE) with the installation of rooftop PV solar panels," said Dato' Ir. Ts. Abdul Razib Dawood, Chief Executive Officer of the Energy Commission.

"The NEM take-up rate thus far has been very good," he told Astro Awani during an interview on 8 February 2022. "We are now into NEM 3.0 that covers the period 2021 to 2023. The RE quota for NEM 3.0 was increased to 800 MW, due to overwhelming response to NEM 2.0 that had a 500 MW quota," added Dato' Razib.

NEM 3.0 has three categories of customers, namely, NEM Rakyat (domestic customers) with a 100 MW allocation; NEM GoMen (Government Ministries and Agencies), also 100 MW; and NEM Nova consisting of commercial and industrial customers that have a 600 MW allocation.

"As of end January 2022, 25% of the NEM Rakyat quota had been taken up; 18% by GoMen customers; and 50% by Nova customers. Allocation is on a first-come first-serve basis. Besides boosting RE uptake to reduce carbon emissions, NEM helps customers reduce electricity costs," he said.

"Customers can install solar panels on their rooftops to produce solar energy for their own consumption. Excess solar energy can be exported to the grid. During the sun-hour peak, more solar energy is produced by the PV panels, and after using what is needed, for example, for household appliances such as refrigerators, the rest can be exported to the TNB grid.

"TNB treats the export as a credit, and during the billing process deducts the value from the customer's TNB bill, at an offset rate of one-to-one. This transaction formula applies to NEM Rakyat and NEM GoMen customers," explains Dato' Razib.

"For NEM Nova customers, the Net Offset Virtual Aggregation (NOVA) method is applicable. It enables them to aggregate solar rooftop panels



# NEM 3.0

## FOR THREE CUSTOMER CATEGORIES

from a few of their premises under one account. For example, DBKL can install solar rooftop panels up to 5 MW, the maximum permitted under NEM 3.0, on its satellite offices and warehouses for self-consumption. This is a cheaper alternative than buying from the Grid at the Levelised Cost of Electricity (LCoE)," said Dato' Razib.

NEM is implemented by the Sustainable Energy Development Authority (SEDA) Malaysia. Customers keen to invest on solar rooftop panels can visit the SEDA website, which has a calculator to work out electricity savings before and after NEM.

NEM has introduced a solar leasing scheme to assist domestic customers defray the initial cost of installing solar rooftop PV panels. Under the scheme, there is no initial deposit. Instead, customers only pay monthly

instalments to the supplier until the full cost is settled. After that, electricity savings from their rooftop installations is all theirs. For large companies, which need bigger rooftop panels, there is the Solar Power Purchase Agreement. The list of suppliers for these schemes can be found on the SEDA website.

Another initiative to boost RE uptake is the Energy Commission's Green Energy Tariff (GET), which took effect on 01 January 2022. "GET will reduce the carbon footprint of customers because their electricity supply comes from RE, either solar or hydro," said Dato' Razib. "GET customers pay a premium tariff, which is now 3.7 sen more, but they are exempt from surcharges and rebates under the Commission's Imbalance Cost Pass-Through (ICPT) arrangement."

GET is bundled with the Malaysia RE Certificate, which is internationally registered, to authenticate that the customer utilises RE-based electricity. GET customers are typically large companies and multinationals with low carbon or net zero carbon emission commitments.

Within a month of its implementation, GET's take-up rate stood at 11%. "We had 308 customers registering for the 4,500 GWh allocation during the GET launch on 1 December 2021," said Dato' Razib. "GET subscription is also on a first-come, first-serve basis.

"We encourage domestic customers to become GET subscribers as well, especially with increasing public awareness of climate change and the damaging effects of carbon emissions," he added.

# GREEN ENERGY TARIFF

## TAKES OFF 01 JANUARY 2022

THE MINISTER OF ENERGY AND NATURAL RESOURCES LAUNCHED THE GREEN ENERGY TARIFF (GET) ON 23 NOVEMBER 2021 TO ENABLE ALL CATEGORIES OF CONSUMERS TO REDUCE THEIR CARBON FOOTPRINT BY USING ELECTRICITY GENERATED FROM RENEWABLE ENERGY SOURCES.

“GET offers 4,500 GWh of electricity from renewable energy sources per annum. Under the programme, consumers will be charged an additional 3.7 sen per kWh of electricity. The proceeds from the GET sale will be used to support the nation’s renewable energy development initiatives and agenda,” said a media statement issued by the Ministry.

GET consumers will be supplied with electricity generated from solar and hydro power. They will also receive the Malaysia Renewable Energy Certificate (mREC), which is registered with international certification bodies to authenticate that their power supply is from renewable sources, added the statement.

At the launch, nine companies pledged to procure electricity under the GET programme. They are CIMB Bank Berhad, Dutch Lady Milk Industries Berhad, Gamuda Berhad, HSBC Amanah Malaysia Berhad, MCIS

Insurance Berhad, Nestle (M) Berhad, Opensys (M) Berhad, Tenaga Nasional Berhad, and Zurich General Insurance (M) Berhad.

The Ministry of Energy and Natural Resources will also enrol with GET, for 31% of its electricity requirements at Wisma Sumber Asli in Putrajaya. In addition, three of the Ministry’s Agencies will be procuring their entire power supply under GET. They are the Energy Commission, Sustainable Energy Development Authority Malaysia (SEDA) and MyPOWER Corporation.

Besides giving customers a choice to reduce their carbon footprint, GET also aims to assist companies and investors based in Malaysia to comply with their Environmental, Social and Governance obligations. GET is also an incentive to attract quality Foreign

Direct Investments, particularly RE100 companies whose goal is to switch to 100% green energy between 2030 to 2050.

Applications for GET opened on 1 December 2021, and the supply of green energy began 1 January 2022. Interested parties can apply via the TNB website or TNB branch. Applications will be processed and approved on a first-come, first-serve basis, and are subject to the GET quota.

GET replaces the myGreen+ programme introduced in 2021. Under myGreen+, subscribers had to buy 100 kWh blocks at eight sen/kWh. Under GET, Malaysian residential customers can buy green energy in 100 kWh blocks. For non-residential customers, the subscription is based on 1,000 kWh blocks. Customers enrolled with the GET programme will receive their mREC after the end of the calendar year.

A GET subscription is valid for one year, with the new subscription cycle commencing automatically upon the expiry of the earlier cycle, and it will be based on prevailing terms and conditions, unless the customer applies for the termination or modification of the subscription.

Applications to increase or reduce a subscription has to be made with TNB. For more information, please visit the GET programme on TNB’s website [mytnb.com.my](http://mytnb.com.my).

## WHAT IS GREEN ELECTRICITY TARIFF

Green Electricity Tariff is a bundled premium offering for consumers who are interested to buy green electricity that is backed by the Malaysian Renewable Energy Certificate (mREC), based on the internationally renowned REC standard.





# NATIONAL ENERGY BALANCE 2019

## A DEFINITIVE REFERENCE FOR THE ENERGY INDUSTRY

THE ENERGY COMMISSION HELD A MEDIA BRIEFING ON 13 DECEMBER 2021 IN CONJUNCTION WITH THE RELEASE OF ITS ANNUAL PUBLICATION, NATIONAL ENERGY BALANCE 2019. THE VIRTUAL SESSION WAS CHAIRED BY THE CHIEF EXECUTIVE OFFICER DATO' IR. TS. ABDUL RAZIB DAWOOD.

The National Energy Balance publication serves as the official energy data reference for Malaysia. It covers three major areas, namely, Energy Supply, Energy Transformation and Energy Consumption for all fuel types. It covers natural gas, liquified natural gas (LNG), crude oil, petroleum products, coal and coke, electricity and renewable energy. A compilation of historical data, the publication is the collective work of more than 60 data providers from Government Agencies, utility companies, independent power producers, co-generators, self-generators, oil and gas companies, and cement and steel manufacturers.

Dato' Razib said that the Commission's National Energy Balance is recognised by world bodies such as the United Nations, and offers insights of Malaysia's energy sector to policy makers, academia and investors. "The data is well-represented by regions in Peninsular Malaysia, Sabah and Sarawak. Our Technical Committee was also meticulous in ensuring the

accuracy, coverage and credibility of the report. Most importantly, we wanted to ensure no one was left behind."

The highlights in the publication are:

- In 2019, total primary energy supply increased by 2.8% (2018: 1.6%) and there was a corresponding increase in total final energy consumption, also by 2.8% (2018: 3.5%). Energy supply and demand growth is in tandem with economic growth and has yet to decouple from it.
- Total primary energy supplied registered at 98,609 ktoe (2018: 95,909 ktoe). All fuels recorded an increase except for coal, which

showed a negative growth of 5.5%. Natural gas has the biggest share of 42.0%, followed by crude oil, petroleum products and others at 33.3%, coal and coke at 21.4% and renewable energy at 3.4%.

- Total energy consumption was reported to be 66,483 ktoe, an increase by 2.8% from the previous year. The industry and transport sectors still dominate, accounting for almost three-quarters of the total energy consumption in 2019, followed by the non-energy sector, commercial, residential and agriculture sectors with their share of 20.5%, 7.0%, 5.0% and 1.4% respectively.
- The final energy intensity dropped from 47.41 toe/RM Million to 46.68 toe/RM Million. Electricity intensity also decreased at a rate of 0.9% from 0.112 GWh/RM Million to 0.111 GWh/RM Million, which indicates an improvement in efficiency. In 2019, better indication of elasticity is observed in the final energy, with a value of 0.64, while electricity shows a value of 0.85.

# SAVE 3.0

## RM400 REBATE TO BUY ENERGY EFFICIENT APPLIANCES

THE "SAVE" ENERGY EFFICIENCY PROGRAM CONTINUED INTO 2022, WITH SAVE 3.0. LIKE THE PREVIOUS CAMPAIGNS, SAVE 3.0 AIMS TO ENCOURAGE CONSUMERS TO PURCHASE HOUSEHOLD APPLIANCES WITH THE 4-STAR OR 5-STAR ENERGY EFFICIENCY LABEL ISSUED BY THE ENERGY COMMISSION.

At the launch of SAVE 3.0 on 07 January 2022, the Energy and Natural Resources Minister said that SAVE 3.0 was expected to benefit 140,000 households in the country. The application for the e-rebate is limited to one electricity bill account for select appliances purchased in 2022 on a first-come, first-served basis. SAVE 3.0 started on 7 January and will end 31 December 2022.

SAVE 3.0 offers a RM400 e-rebate, which is double the value of SAVE 2.0. In addition, the range of appliances has expanded from two products to two categories.

Save 3.0 rebates are to be distributed across two product categories. Each appliance will have its own cap on the rebate that can be claimed (between RM50 to RM200).

**Category 1:** Air conditioners and refrigerators (same as in SAVE 2.0)

**Category 2:** Televisions, washing machines, microwave ovens and rice cookers.

Spearheaded by the Ministry, SAVE is implemented by the Sustainable Energy Development Authority (SEDA), with the support of the Commission. Its main objectives are to:

- Increase the total number of 4 and 5-star energy efficient electrical appliances and energy efficient appliances in the market; and
- Increase public awareness and encourage consumers, especially domestic consumers, to purchase energy efficient appliances and save on power consumption.

According to the Minister, SAVE 3.0 is funded by the Electricity Supply Industries Trust Account (AAIBE), and is a continuation of SAVE 1.0 and

SAVE 2.0. He shared that SAVE 2.0 recorded the redemption of 134,000 e-rebates and energy savings worth RM26.8 million. With the implementation of SAVE 3.0, the Ministry expects to see energy savings of 153 GWj a year, which is equivalent to RM60.45 million and reduce 103,890 tonnes of carbon dioxide emissions a year.

With more Malaysians buying energy-efficient appliances, the country can move closer to achieving the goals of its National Energy Efficiency Action Plan (2016-2025).

SAVE 3.0 is open to Malaysian citizens, who are registered with electricity providers such as TNB, SESB, Sarawak Energy Berhad (SEB) or Nur Power Sdn. Bhd.

The appliances can be purchased in two ways. One, by presenting the electricity bill personally at registered shops or supermarkets. Two, by applying for an e-rebate through recognised e-commerce platforms such as Shopee, Lazada and PG Mall. SAVE 2.0 e-rebate recipients are not eligible to apply for SAVE 3.0's Category 1 products.

During the launch of SAVE 3.0, the Minister also announced that RM500 worth of rebates would be given to households to buy electrical appliances damaged by floods under the Malaysian Family Flood Relief assistance. He said that 1,100 electrical shops had registered for the programme and the list of aid recipients was coordinated by the state-level Disaster Operations Control Centres and the National Disaster Management Agency.

He added that those who had redeemed the flood relief rebate can apply for SAVE 3.0 as the two were different programmes, despite using the same platform.

"The SAVE program's e-rebate application is only for the purchase of energy-efficient electrical appliances, and redemption cannot be made using rebates from the flood relief fund. These two rebates must go through separate transactions," he added.

For further enquiries, please contact SEDA at 03-8870 5800, or email them at [saveenergy@seda.gov.my](mailto:saveenergy@seda.gov.my). More information on the SAVE 3.0 campaign can also be found on the SEDA website.

## APPLICATION OF E-REBATE THROUGH PHYSICAL PURCHASE OF ELECTRICAL APPLIANCES



### CONSUMER

- Purchase electrical appliances directly through registered retailers under SAVE 3.0 programme. (Visit [www.saveenergy.gov.my/publics/retailer](http://www.saveenergy.gov.my/publics/retailer) for more details)
- Bring along electricity bills and NRIC.



### E-REBATE APPLICATION

Retailers will assist to check eligibility based on electricity bill and apply the e-rebate on behalf of consumers.



### PURCHASE OF ELECTRICAL APPLIANCES

- Eligible only for electrical appliances with 4 & 5 star rating energy consumption.
- Grants discounts of up to RM400 e-Rebate (RM200 for Category 1 and RM50/RM100/RM200 for Category 2)

# PEMUDAH SPECIAL AWARD

PEMUDAH PRESENTED A SPECIAL AWARD TO THE ENERGY COMMISSION, IN RECOGNITION OF THE LATTER'S ROLE IN MALAYSIA'S IMPROVED RANKING IN THE WORLD BANK'S DOING BUSINESS REPORT 2020, "GETTING ELECTRICITY" CATEGORY. THE REPORT RANKED MALAYSIA 4TH IN THIS CATEGORY IN 2020, COMPARED TO 59TH POSITION IN 2012.

PEMUDAH, a taskforce established by the Government to make Malaysia a more business-friendly environment, presented a Special Award in conjunction with its 15th anniversary. PEMUDAH was established in 2007 and is a collaboration between the public and private sectors.

Among its many engagements include that with the Commission and the energy industry. One of them is to solve the issue of power quality based on the high number of complaints received from businesses. As a result of

interventions by the Commission and Tenaga Nasional Berhad, the number of complaints fell by 51%. PEMUDAH is co-chaired by the Minister in the Prime Minister's Department (Economy), Chief Secretary to the Government and captains of industry.

The Economic Planning Unit and Malaysia Productivity Corporation serve as the PEMUDAH Secretariat, to facilitate initiatives on regulatory reforms required to enhance the ease of doing business in Malaysia.



**Dato' Ir. Ts. Abdul Razib Dawood**  
Chief Executive Officer  
Energy Commission



# ST DATASHARE

DATA AS AT 31 DECEMBER 2022

## ELECTRICITY AND PIPED GAS SUPPLY



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

**Total Energy (GWh):**  
**130,616 GWh**

**Peak Demand (MW):**  
**19,183 MW** [24 May 2022]

**Total Installed / Dependable Capacity (MW):**  
**26,587 MW**

**Reserve Margin (%):**  
**38.6%**

### GENERATION MIX (%)

**Coal:**  
**55.50%**

**Gas:**  
**37.10%**

**Hydro:**  
**5.24%**

**Solar:**  
**1.24%**

**Others:**  
**0.92%**

### SAIDI (MINUTE/CUSTOMER/YEAR)

\*SAIDI data as of 25 December 2022 for Peninsular Malaysia and 30 November 2022 for Sabah

**Peninsular Malaysia:**  
**43.77**  
Minutes / Customer / Year

**Sabah:**  
**345.28**  
Minutes / Customer / Year

## ENERGY SUSTAINABILITY



PPTEC Compliance (%):



Electricity Savings under NEEAP (%)\*:

**5.78%**  
8,281.25 GWh  
i.e. equivalent to  
**RM2.035 billion**

\*This savings is as of June 2022 while the reporting data for the second half of 2022 can only be updated by the end of January 2023.

### RE INSTALLED CAPACITY (%)

**Hydro:**  
**49.70%**

**Solar:**  
**31.60%**

**Biomass:**  
**16.00%**

**Biogas:**  
**2.70%**

- Covers Peninsular Malaysia and Sabah only.
- Data sources are TNB, IPP, SESB, Single Buyer, SEDA, MGTC, OAS dan ECOS.
- Self-gen with "other" fuel is excluded.
- Total hydro is including mini hydro capacity.

### POWER PLANTS FOR COMMISSIONING

**Southern Power Generation (SPG) Power Plant, Johor**

- COD GB1 : 1 Jan 2021
- COD GB2 : 19 Feb 2021

**Edra Power Plant, Melaka**

- COD GB1 : 16 Dec 2021
- COD GB2 : 31 Jan 2022
- COD GB3 : 28 Feb 2022

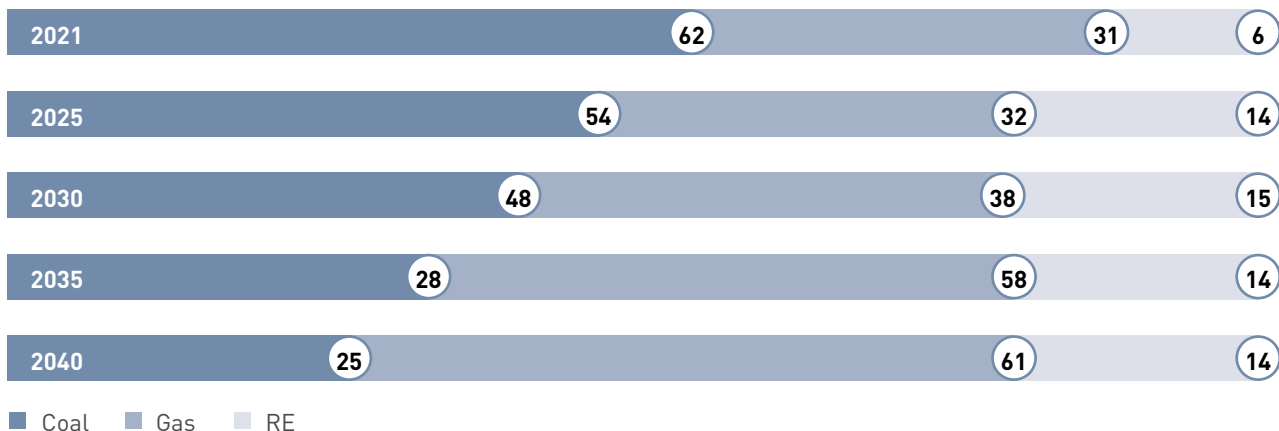
**Serudong Power Plant, Sabah**

- COD DG2: 9 Mar 2022
- COD DG3: 31 Mar 2022
- COD DG1: 13 May 2022

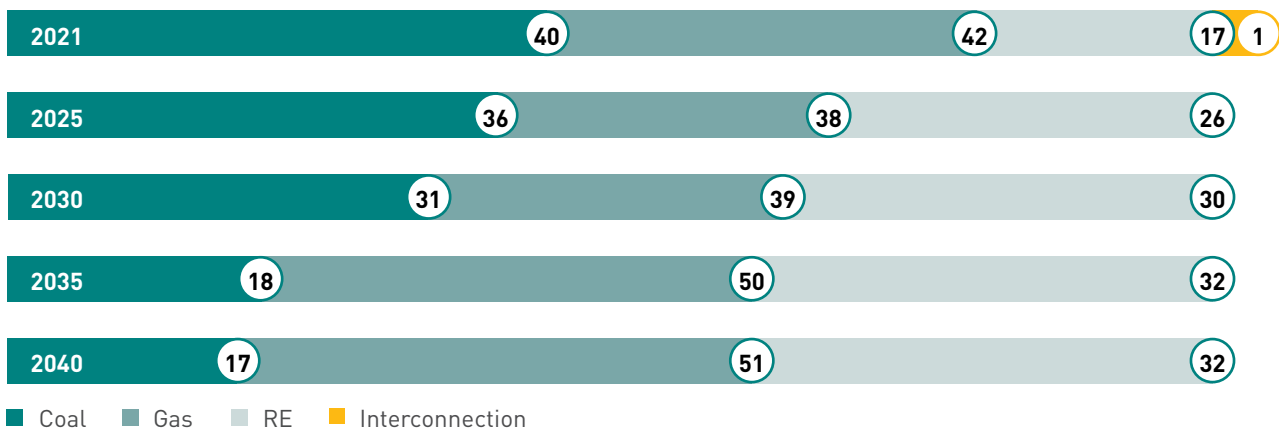
**Libaran Power Plant, Sabah**

- COD : 28 Feb 2022

### PROJECTED GENERATION MIX FOR PENINSULAR MALAYSIA (%)



### PROJECTED CAPACITY MIX FOR PENINSULAR MALAYSIA (%)



## ECONOMIC EFFICIENCY



Regulatory Period:

**RP3** (2022-2024)

Average Base Tariff Rate For Peninsular Malaysia:

**39.95** Sen/kWh

Tariff Adjustment under ICPT Mechanism for July to December 2022:

Domestic Consumers:

**REBATE**

**2** Sen/kWh

Non-Domestic Consumers:

**SURCHARGE**

**3.7** Sen/kWh

## REGULATORY QUALITY



Number of Complaints Received:

**1,019**  
Complaints

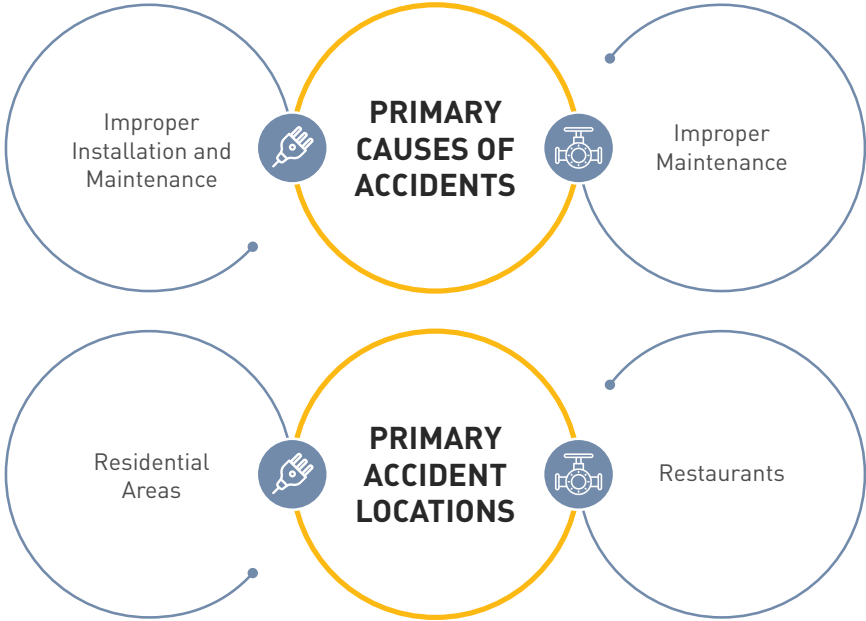
Number of Complaints Resolved:

**902**  
Complaints

Number of Complaints Under Investigation/ For Further Actions:

**117**  
Complaints

**SAFETY**



Number of Electrical Accidents:

**56 Cases**

---

Number of Piped Gas Accidents:

**1 Case**

**COMPETENCY AND CONTRACTORS**

Total Number of Electrical Certificates of Competency:

**5,114**  
Certificates

Total Number of Gas Certificates of Competency:

**1,208**  
Certificates

Number of Electrical Contractor Registrations (KBE, KE, KPE, KPT, PPS, UPP):

**7,535**  
Contractors

Number of Gas Contractor Registrations:

**119**  
Contractors

Total Number of Institutions Accredited to Facilitate Electrical Competency Examinations:

**140**  
Institutions

Total Number of Institutions Accredited to Facilitate Gas Competency Examinations:

**2**  
Institutions

**CERTIFICATES OF APPROVAL**

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

**10,767** Certificates of Approval  
**6,287** Renewals

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

**1,274** Certificates of Approval

Number of ATI and ATO:

**1,949** ATI  
**1,862** ATO

**ELECTRICAL AND GAS LICENCES**

Number of Electrical Licences:

**2,720** Licences

Number of Third Party Access Licences:

**44** Licences

Number of Private Gas Licences:

**3,546** Licences

Number of Retail Gas Licences:

**778** Licences

**INVESTIGATION PAPERS**

Number of Investigation Papers Opened for Legal Actions:

**153** Investigation Papers

Number of Prosecution Cases:

**13** Cases

Number of Compounds:

**90** Compounds

Amount of Compound paid:

**RM209,000.00**



# LISTEN BEFORE YOU LEAP



*While drafting of the National Energy Policy (2022-2040) falls within the purview of senior policymakers at the Economic Planning Unit at the Prime Minister's Office, the Government invited a few NGOs to provide objective feedback on the findings of consultants before decisions were made. One of them was the think tank Institute of Democracy and Economic Affairs (IDEAS), whose Chief Executive Officer Dr. Tricia Yeoh attended one of these sessions.*

*She says that while the Government's efforts to be inclusive are commendable, the closed-door sessions could have been more all-encompassing to involve more consumers from across the board. She also shares some cautionary advice to take into account as Malaysia transitions into a low carbon economy by 2030 and a carbon neutral nation as early as 2050.*



In my role as IDEAS Chief Executive Officer, I participated in one session within the esteemed Steering

and Technical Committees that helped shape the National Energy Policy (NEP) 2022-2040. During this session, I provided valuable feedback on circulated drafts and engaged in discussions as consultants presented their study findings. These dialogues were enriched by interactions with senior policymakers responsible for finalising options presented to the National Development Planning Committee (NDPC) and subsequently, to the Cabinet.

It's important to note that while I contributed to a single session, IDEAS senior fellows took the lead in the remaining sessions. These committed individuals, representing IDEAS, worked alongside government officials to enhance clarity on consultant initiatives. Our discussions centered on understanding the potential impacts

of various proposals on different agencies, each with its unique mission, all contributing to Malaysia's long-term growth trajectory.

While it is good to have IDEAS and a few other academic institutions to participate in different stages of these debates, a more inclusive approach would be to collect feedback and contributions through public hearings instead of closed-door discussions for the selected few.

I am not aware if there is or was a mechanism to collect public opinion or direct participation of consumers / people on the street to be used in the different stages of the study and policy discussion. Given the centrality of this topic, I consider this to be pertinent.

This kind of engagement would help to bring outside perspectives, including from independent specialists or consumers not linked to any formal organisation. One potential issue

of having closed-door discussions and limited visibility to what is being discussed is that there is a lower ability of the public to influence policy choices and mobilise actions towards some goals, such as the ambitious green goal target. Hence, there is a risk that entrenched interests, like the companies that benefit from today's energy choices, can exert disproportionate influence in shaping the debate and influencing outcomes.

One interesting aspect of the NEP is how it evolved over time. When it started in 2020, the global commitment towards net zero by 2050 from companies and Governments was not as strong as it came to be.

## GAPS TO ADDRESS

The NEP is a road map to be implemented in phases. For now, the high priority actions should be in drafting the mechanisms for the carbon tax policy to be implemented as announced by the Government.



# WHO'S WHO

## DRAFTING THE NATIONAL ENERGY POLICY 2022-2040

The National Energy Policy study is governed by a Steering Committee and a Technical Committee. The Steering Committee and Technical Committee are chaired by the Economic Planning Unit (EPU). Decision making at the Steering Committee and Technical Committee are supported by findings of the National Energy Policy project team and a panel of experts involved for consultative purposes where necessary throughout the study. The membership of the Steering Committee and Technical Committee is as follows:

### STEERING COMMITTEE (SC)

#### CHAIR

Director General, Economic Planning Unit (DG, EPU)

#### SECRETARIAT

Energy Division under the Economic Planning Unit (ED, EPU)

#### MEMBERS

- ⊙ Economic Planning Unit, Prime Minister's Department (EPU)
- ⊙ Ministry of Energy & Natural Resources (KeTSA)
- ⊙ Ministry of Science, Technology & Innovation (MOSTI)
- ⊙ Ministry of Environment and Water (KASA)
- ⊙ Ministry of Finance (MOF)
- ⊙ Ministry of International Trade and Industry (MITI)
- ⊙ Ministry of Transport (MOT)
- ⊙ Ministry of Plantation Industries and Commodities (MPIC)
- ⊙ Ministry of Domestic Trade and Consumer Affairs (KPDNHEP)
- ⊙ Ministry of Rural Development (KPLB)
- ⊙ Ministry of Housing and Local Government (KPKT)
- ⊙ State Economic Planning Unit (UPEN) Sarawak
- ⊙ State Economic Planning Unit (UPEN) Sabah
- ⊙ Public Service Department (JPA)
- ⊙ Energy Commission (ST)
- ⊙ Bank Negara Malaysia (BNM)
- ⊙ Malaysia Petroleum Management (PETRONAS)

#### BY INVITATION

- ⊙ Institute for Democracy and Economic Affairs (IDEAS)
- ⊙ Institute Energy Policy and Research (IEPR)
- ⊙ State Economic Planning Unit (UPEN) – Peninsular Malaysia states
- ⊙ Other members will be nominated if required

Source: National Energy Policy 2022-2040 Inception Report

Since there were many discussions that have taken place and the Government stating its commitment to conduct feasibility studies on carbon pricing, such as carbon tax and the Emissions Trading Scheme, there should be progress in drafting the framework in monitoring Greenhouse Gas (GHG) emissions under the future carbon pricing mechanism.

As a think tank, IDEAS can play a role by producing research specifically for conducting feasibility studies on the proposed mechanism for the carbon tax policy and the Emission Trading Scheme. IDEAS can also undertake projects in bridging the major stakeholders by conducting closed-door meetings and discussions on policy drafting.

The other gap that we can identify is in relaying the information to the public. Efforts must be made to create the narration that is needed to gauge public opinion and most importantly, public support of the proposed carbon tax policy.

Also, given its almost 20-year life span, the NEP must be resilient enough to counter disruptive trends and influences along the way. It should ensure that the country has adequate energy reserves and the capacity to ramp up production in the event of a future global energy shock. Intermittent renewables will be unable to supply a reliable source of electricity.

Malaysia should also seek to diversify its renewables supply chains. Foreign entities with the necessary technology and know-how in terms of renewables should be welcomed to Malaysia in order to help facilitate the establishment of the renewable industry here in Malaysia.

At the same time, Malaysia must be mindful of geopolitical events. While the Middle East is expected to be a major supplier of hydrogen in the future, Malaysia should consider looking at alternative sources in the event of supply chain disruptions due to political instability in producer countries. The energy crisis in Europe triggered by the Ukraine crisis holds many lessons for the rest of the world.

## NOT SMOOTH SAILING

As energy-fuelled inflationary pressures currently taking place in Europe and Asia have demonstrated, the energy transition is unlikely to be a smooth process. During the challenging transitory process from fossil fuels to renewable energy, countries may ironically encounter an increased dependence on fossil fuels and therefore experience increased energy prices, putting pressure on consumer wallets and Government budgets.

We saw this back in 2021, when China's clampdown on coal burning inadvertently caused blackouts in certain Chinese cities, as well as the current Biden Administration's hostility towards fracking made the US more vulnerable to high energy prices.

The Malaysian public should also be made aware that the energy transition will not necessarily be easy, although our status as a net energy exporter (as of now) may help cushion some of the blow.

It will thus be crucial for Malaysia to balance its environmental, social, and governance (ESG) commitments with a realistic appreciation of the complexity of the shift towards renewables. It is also crucial to appreciate the political economy of Malaysia's energy industry, especially in terms of the labour market as well as the local economies of oil and gas producing states such as Sabah and Sarawak.

## PAST LESSONS

Transitioning to a carbon-neutral nation from a fossil fuel-reliant economy comes with many challenges and only through a concerted effort by all actors, from the Government to the public and private sectors together with NGOs, are we able to implement a policy that most suits the economy.

Insofar as the Energy Commission is concerned, I believe that its current role does fit into the envisioned plan. There is no need for a change, but the Commission needs to anticipate that there will be addition to the scope that



they currently work on as a result of embracing the transformation to a low-carbon and carbon neutral nation.

The Government, meanwhile, should try to apply the invaluable insights gained from the past attempt at introducing the GST that was met with a mixed reaction from the public. This experience will be useful when introducing the carbon tax policy, which like the GST, relies heavily on the political stand and public perceptions. It should create a narration that is lucid for the public to understand and avoid it from being politicised.

Public buy-in will have a significant impact in ensuring that Malaysia has a sustainable energy policy that can last for the longest of time and have positive outcomes at both national and global levels.

I wish to conclude my piece by quoting an article by Leong Yuen Yoong, Michael James Platts and Woo Wing Thy published in "The Edge Malaysia (December 4, 2021)", where they said: "Malaysia's decarbonisation framework needs to go beyond technical fixes. The 12MP rightly urges a mind-set change and public's behavioural shift for green growth."

Indeed, the success of the NEP will ultimately rest with consumers – on how they manage power consumption and energy efficiency at home, at work and in public spaces. It is a question of attitude.







# HEARTIEST CONGRATULATIONS

YBHG. DATO' Ir. Ts.  
**ABDUL RAZIB BIN DAWOOD**  
CHIEF EXECUTIVE OFFICER

on being conferred

**Darjah Kebesaran Jiwa Mahkota  
Kelantan yang Amat Mulia (D.K.J.M.)**  
that carries the title **Dato'**

by  
**His Royal Highness  
Duli Yang Maha Mulia  
Sultan Muhammad V  
Sultan of Kelantan**

on the occasion of  
**His Royal Highness' 53rd Birthday  
on 12 November 2022**

with salutations from  
**#TeamST**





# 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.

