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# Driving Malaysia's solar power adoption through commercial, residential properties



The Malaysian Reserve, Malaysia

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This scheme incentivises property owners to invest in solar energy systems by offsetting their electricity bills and potentially earning revenue from surplus energy generation

by AUFA MARDHIAH & ZAHIN ZAILANI

IN MALAYSIA, both commercial and residential properties have been increasingly adopting solar power installations. The Net Energy Metering (NEM) scheme allows property owners to instal solar panels and generate electricity for their consumption while also selling excess energy back to the grid.

This scheme incentivises property owners to invest in solar energy systems by offsetting their electricity bills and potentially earning revenue from surplus energy generation. Additionally, there are various financing options and incentives available to encourage solar power adoption, making it accessible to a wider range of consumers.

According to the Sustainable Energy Development Authority (SEDA), NEM was introduced in November 2016 to promote the adoption of renewable energy (RE), particularly solar energy.

Initially, the scheme had a quota allocation of 500MW until 2020. To further incentivise NEM uptake, NEM 2.0 was introduced in January 2019, allowing for a true net energy metering concept where excess solar energy could be exported back to the grid on a one-to-one offset basis.

The implementation of NEM was overseen by various authorities, including the Ministry of Energy and Natural Resources (KETSA), and the Energy Commission Malaysia (EC) SEDA Malaysia.

Due to high demand and to promote solar energy usage, NEM 3.0 was launched in December 2020, offering more opportunities for consumers to instal solar PV systems. The energy and natural resources minister introduced NEM 3.0 to accommodate the overwhelming response from the photovoltaic (PV) industry.

The new programme offers an additional quota of 100MW for NEM Rakyat and 300MW for NOVA. The quota offer period extends until December 2024 or until all quotas are allocated, with the total quota allocation under NEM 3.0 being up to 1,450MW.

In a statement to *The Malaysian Reserve (TMR)*, SEDA stated that the NEM programme aims to encourage the installation of solar panels on rooftops that will encourage clean electricity generation for homeowners and businesses.

"Since its inception, NEM has provided opportunities for individuals such as homeowners to contribute to the energy transition agenda. This is definitely a positive progress for Malaysia's energy landscape as the energy transition agenda is a national agenda that requires a whole of nation approach from individuals to businesses," it said.

SEDA also stated that as of February 2024, the breakdown of its solar residential by programme is at 16.86%.

Approval mandates obtaining a licence for systems exceeding 72kWp for three-phase and above 24kWp for single-phase. Consumers can purchase systems outright or opt for leasing arrangements, offering power purchase agreements or solar leasing.

Tax incentives for homeowners are limited, while businesses can benefit. Options for financing include extended credit card payments or bank loans. This promotes both reduced bills and environmental sustainability.

### Homeowners' Insight of Solar Panel Usage

In Malaysia, homeowners typically use solar panels to reduce their electricity bills and achieve long-term savings on energy costs. Additionally, many homeowners are motivated by environmental concerns and aim to reduce their carbon footprint by using RE sources like solar power.

Going further into the consumer perspective, *TMR* had a brief conversation with several homeowners who have installed solar panels to gain insights into their experiences. 43-year-old Mohd Ridzam Abdullah used



A homeowner highlighted that one of the advantages is, during power outages, the house remains illuminated and Internet connectivity is maintained

his savings from the Employee Provident Fund to instal an 8kW solar panel system which cost around RM30,000.

He said using solar panels at home affected his monthly electric bill. "My monthly electricity bill, which was between RM800-RM1,300, has decreased significantly to RM450-RM90," he said.

Mohd Ridzam also emphasised that employing solar panels enables him to track his home's electricity consumption via a smartphone app. Nonetheless, he highlighted Tenaga Nasional Bhd's (TNB) monitoring of his residence due to the surplus electricity being resold to TNB.

"The use of solar panels at home is indeed worthwhile. While it may require some time for it to become financially rewarding, the investment is still worth it," he further added.

On the other hand, 51-year-old Mohd Syamil Mohd Yusri recalled his encounter in employing a solar hybrid system as opposed to being connected directly to the grid.

"If a solar panel is installed primarily for cost savings, the electricity bill reduction is not significant after factoring in the initial investment. However, if the goal is uninterrupted power supply, the investment is worthwhile," he told *TMR*.

According to him, installing solar panels at home requires a substantial upfront investment and it may take several years to recoup the costs through savings on electricity bills.

Nevertheless, he highlighted one of the advantages is that during power outages, the house remains illuminated and Internet connectivity is maintained, except in cases of total blackouts.

However, he said the inverter needs to be maintained and safeguarded by the owner.

"If it is invaded by lizards, it will affect the metal-oxide-semiconductor field-effect transistor (MOSFET) and Insulated gate bipolar transistor (IGBT) inside the solar panel," he said.

Both the MOSFET and IGBT are types of semiconductor devices used to power electronics, including solar panel systems.

MOSFET is a type of transistor that operates by controlling the flow of current between the source and drain terminals using an electric field.



The TBH project spans over 64.75ha of land all with homes that have solar power amenities built into them

### Breakdown solar residential by programme as of Feb 2024

Programme	Total Applications	MW (AC)	%
FIT	9,197	69.30	5.11
NEM	21,383	159.47	11.75
NEM2.0	3,055	24.20	1.78
NEM3.0 (Rakyat)	18,328	135.26	9.97
<b>Total</b>	<b>30,580</b>	<b>228.77</b>	<b>16.86</b>

In a solar panel system, MOSFETs are commonly used in charge controllers and inverters to regulate the flow of electricity from the solar panels to the battery or grid.

MOSFETs are known for their high switching speed, low on-resistance and efficiency, making them suitable for applications requiring high-frequency switching.

Meanwhile, IGBT is a semiconductor device that combines the high-speed switching capability of a MOSFET with the high current-handling capability of a bipolar transistor.

In solar panel systems, IGBTs are often used in inverters to convert the DC power generated by the solar panels into AC power suitable for use in homes or to feed into the electrical grid and preferred for high-power applications.

### Govt to Drive Solar Energy Adoption

The Green Technology tax incentives, effective from Jan 1, 2024, introduces new qualifying activities like green hydrogen, electric vehicle (EV) charging stations, and wind energy, encouraging sustainable practices. Businesses can apply for GITA projects and GITE Solar Leasing until Dec 31, 2026, through Malaysian Investment Development Authority (MIDA).

The National Energy Transition Roadmap (NETR) aims for net-zero emissions by 2050, with targets of 31% RE by 2025, 40% by 2035, and 70% by 2050, fostering a gradual increase in RE shares.

Flagship projects like PV are anticipated to draw over RM25 billion in investment, creating up to 23,000 jobs while reducing greenhouse gas emissions by over 10,000Gg CO<sub>2</sub>

equivalent annually.

NETR's Responsible Transition (RT) Initiative fosters economic growth through green mobility, renewable energy, and emerging technologies, with projected investments of RM1.2 trillion to RM1.3 trillion by 2050 and an additional RM220 billion to GDP, creating 310,000 green jobs by 2050, benefitting medium to low-income households.

Prime Minister Datuk Seri Anwar Ibrahim lauds NETR for job creation, boosting investment, and ensuring energy security, aiming for regional leadership in clean energy.

The ENI initiative launches the National Energy Transition Facility (NETF) to streamline investments for energy transition projects, with an allocated RM2 billion seed funds to support less bankable projects, crucial for Malaysia's decarbonisation efforts.

Diving deeper into the NETR, it highlighted some current statistics of energy emissions of Malaysia. Natural gas will not only be a transitional fuel, but also the main contributor of Total Primary Energy Source (TPES) at 57 megatonnes of oil equivalent (Mtoe) at 56% followed by renewables that include solar, hydro and bioenergy, which collectively contribute 23% of TPES in 2050 from a mere 4% in 2023.

Since 2011, solar PV remains the most encouraging segment of the national RE landscape with an installed capacity compound annual growth rate (CAGR) of 48%, expanding from 0.1GW to 2.6GW.

In short, based on past accomplishments and compliance with established benchmarks, the NETR report affirmed a high level of confidence that Malaysia can attain a 70% RE share of installed capacity by 2050, primarily propelled by the installation of solar PV systems.

Nevertheless, the report underscored the imperative need for steadfast commitment to the expansion of solar capacity over the next three decades to reach a total installed capacity of 59GW by 2050.

This commitment comes with some challenges, naturally. Large-scale-solar (LSS) development includes a variety of problems. The scattered development approach and lengthy permitting processes lead to higher development costs. This in turn limits the potential of LSS projects to be able to add to RE efforts.

Furthermore, there are regulatory barriers and a technology-agnostic LSS bidding mechanism further slows the potential growth of innovative solar technologies like floating solar and agrivoltatics. Such limitations shine a light on the need to be more streamlined and more supportive frameworks to foster broader adoption of RE solutions in the future.

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The development by Country Garden Malaysia which was launched in 2014 with some homes equipped with solar panel systems

Currently, the estimated investment required by NETR anticipates that Malaysia needs an investment of up to RM1.3 trillion by 2050. In this decade alone, 18% of funding is required mainly in RE power generation and green mobility. High investment in RE power generation means high expansion of solar PV and hydropower as well as improving and strengthening of public infrastructure.

Regarding green mobility, the investments call for the expansion of public transportation, amplification of domestic EV production capacities and increased manufacturing of EV charging infrastructure.

Despite all the efforts, the adoption of solar panels in residential areas faces challenges such as high upfront costs, limited financing options and technical barriers. Additionally, some homeowners may lack awareness of the benefits of solar energy or may be hesitant to invest in solar panels due to concerns about reliability or maintenance.

While the exact percentage of residential areas in Malaysia using solar panels may vary, it is generally considered to be a growing trend as awareness of RE increases and technology advances. However, the adoption rate is still relatively low compared to countries with more mature solar markets.

### Townships with Solar Panels Equipped

Another contributor to the spreading of solar panel usage within Malaysia is the real estate developers who have decided to invest in housing projects that have solar power systems built in.

In Malaysia, the integration of solar panels into residential developments is an emerging trend among forward-thinking property developers, especially with the growing emphasis on sustainability and energy efficiency.

Some notable residential areas and developments that have been equipped with solar panels by developers in Malaysia include a township in Taman Bertam Heights (TBH) developed by Teladan Setia Group Bhd, a subsidiary of Teladan Setia Sdn Bhd.

The project which is also Malacca's first solar-powered ready homes is a collaboration with Micro Energy Holdings (M) Sdn Bhd (MEH).

The project spans over 160 acres (64.73ha) of land all with homes that have solar power amenities built into them. These solar PV systems in its TBH are part of the Phase 2A gated and guarded housing development project in Malacca.

These will be Malaysia's first venture into readily-installed new homes powered by solar systems.

According to a local news report by April 2023, Teladan will have pre-installed solar PV systems ranging from 2kWp to 4KWp for 352 housing units within the development.

Teladan mentioned in a statement that these solar-ready homes are expected to drive down electricity costs for homeowners by up to 75% in savings.

Barring extenuating circumstances, the green housing development project is expected to be launched in the third quarter of the financial 2023 (3Q23) and to be completed in 4Q26. It has an approximate gross development value of RM242 million.

In addition to the solar PV systems saving homeowners up to 75% savings, Teladan also seems to be eyeing the addition of electric vehicle (EV) charging stations.

Teladan MD Richard Teo Lay Ban, stated that the group also plans to incorporate EV charging stations in their future development prospects to facilitate and boost the adoption of EVs and will help in mitigating carbon emissions.

This addition on top of the solar PV initiative, shows the dedication of pioneering companies that stays prudent and tailored to meet market needs, while also recognising

the need and benefits of a greener, safer and more connected Malacca living experience.

The strive towards being more eco-friendly however must not fall squarely on housing corporations, and while the market might be amicable towards green homes, there is still work to be done to spread this idea further in the public consciousness.

Thus, it is also up to the government, as well as entities collaborating with the Malaysian government to be able to lead Malaysia into an eco-friendlier future with the help of massive initiatives such as pre-installed solar PV housing.

Other than that, there is Sunway City, Selangor, which has pioneered efforts in sustainable living, evidenced by its certification as Malaysia's first Green Building Index-certified township and a Low Carbon City recognised by the Malaysian Ministry of Environment and Water.

Major developer, Sunway Property has been incorporating solar panels in various parts of the township, including residential units, to promote sustainable living. Sunway also stated its ambitious goal on its website to obtain 40% of its electricity from renewable sources by 2030, aligning with Malaysia's national objective.

To achieve this, the group plans to either locally generate renewable energy or purchase it from solar farms or green power stations. Besides that, the group is also intensifying efforts to upgrade the energy infrastructure in Sunway City Kuala Lumpur and fostering innovation to drive a widespread shift toward clean energy.



Sunway Group's commitment to sustainability extends to its Green Building Policy, aiming for all new buildings to be green-certified by 2025

### Sunway City KL

In 2022 alone, Sunway City Kuala Lumpur (KL) generated 3,210MWh of RE, sufficient to power around 443 homes annually, while the group as a whole produced nearly 1003Wh, capable of powering over 850 homes yearly.

Apart from that, the city prioritises preserving nature by dedicating 40% of its land to green spaces and blue spaces, hosting over 30,000 trees and implementing eco-friendly initiatives like the use of NeuPave concrete material for pavements to reduce heat absorption and mitigate flooding.

Additionally, the city boasts a comprehensive public transit system, including bus rapid transit services and elevated canopy walkways, which significantly reduce carbon emissions and vehicular traffic.

Sunway Group's commitment to sustainability extends to its Green Building Policy, aiming for all new buildings to be green-certified by 2025. These efforts align with the UN Sustainable Development Goals and exemplify Sunway's dedication to leading the way in sustainable urban development.

Another residential project present in Malaysia is located in the heart of Setia Eco Park in Shah Alam. This Eco Park boasts D'Network — a food and beverages (F&B) hub with many facilities that contain solar PV systems in many of its facilities.

On the D'Network website, they mention that are the first solar-powered hybrid F&B hub. D'Network is powered by 207kWp of solar power system instead of the typical electrical grid supply which creates a sustainable dining experience for its patrons.

In addition to that, they also have the world's first solar-powered musical fountain at this hub. Named the Symphony of Sustainability, their iconic fountain charges during the day and lights up with many colours at night, where D'Network patrons can tune into the changing lights and tunes.

An interesting benefit of the sustainable environment of D'Network is how the shade provided by the Cereka Hill forest reserve creates an environment where it is one to two degrees cooler than the general surrounding area. This shows an additional benefit to developing residential areas that keep sustainability in mind.

Finally for pet owners there they also boast the world's first solar-powered pet-friendly park. This park has manicured greenery as well as waste disposal bins where owners and pets can interact with other owners and pets in this pet park.

Other notable residential areas and developments that have been equipped with solar panels by developers in Malaysia include Setia Eco Glades, Cyberjaya. Developed by SP Setia, the project features homes with solar PV systems and other green technologies, aiming for energy-efficient living. The freehold town has built-up of 2,300 sq ft to 4,297 sq ft (399.2 sq m) for houses and was completed around 2015.

### Diamond City, Semenyih

The development by Country Garden Malaysia which was launched in 2014, boasts of being the first Spanish villa township in Malaysia, with some homes equipped with solar panel systems. According to Diamond City website, the project is currently ongoing as of April 2024. From the project, unit 2A has been fully completed, while unit 2B is at 90%, unit 2C at 50% and unit 2D at 25% completion rate.

Eco Ardence, Setia Alam, developed by Eco World Development Group Bhd project includes homes that are designed with sustainability in mind, featuring solar panels to reduce dependence on non-renewable energy.

The project offers 999 units spanning over 533 acres and is a mixed residential development consisting of semi-Ds, link homes, bungalows, terrace homes and townhouses with various configurations within the compound. The properties in this estate range from 1,912 sq ft to 4,300 sq ft for houses, 1,510 sq ft to 1,650 sq ft for offices, and 3,300 sq ft for shop offices.

Eden @ Jallil City located at Taman Puncak Jallil, Seri Kembangan which was developed by Eden Estates, focuses on sustainable homes with solar power and rainwater harvesting systems. The freehold terraced housing project was completed in 2014 and consists of a total of 64 units.

Tropicana Aman, Kota Kemuning. Developed by Tropicana Corp, the township focuses on sustainable and eco-friendly features, including homes with solar panels. Bandar Rimbu, Telok Panglima Garang by IJM Land, includes sustainable features like solar panel installations to create a green living environment.

With developments readily equipped with solar panel systems, these developers are contributing to the trend of sustainable residential developments by incorporating solar energy systems, which not only help reduce the carbon footprint but also offer residents long-term savings on energy costs. As Malaysia continues to promote renewable energy, more developers are likely to include such eco-friendly initiatives in their future projects.

To conclude, there seems to be large and continuously growing support for solar projects in Malaysia. With experts and the plethora of organisations, as well as the government, all striving towards a more eco-friendly and renewable energy-based future, Malaysia's energy landscape will be found to shift more sustainably over the next few decades.

## Empowering Our Future with Solar Energy



## Earth-friendly Energy for All

<p><b>NEM Rakyat</b></p> <p>Offered to residential users to install the solar panel on their rooftops. The clean energy generated will be consumed first, and any excess will be exported to the grid. The grid then feeds back to the user's meter, which will be credited with the amount of "net" electricity.</p>	<p><b>NEM GoMen</b></p> <p>Apply for any Government incentives. The energy from the rooftop solar panel will be consumed first, and any excess will be exported to the grid. The amount to be credited to the user's meter will be based on the net electricity, taking a "net" offset cost.</p>	<p><b>NOVA</b></p> <p>Available for the commercial building. Apply for any Government incentives. The project owner must be a Malaysian citizen. The project owner must be a Malaysian citizen. The project owner must be a Malaysian citizen. The project owner must be a Malaysian citizen.</p>
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### How to Apply?

<p><b>Outright Purchase Method</b></p> <p><b>STEP 1</b></p> <p>3 payment choices</p> <ul style="list-style-type: none"> <li>• Cash</li> <li>• Credit card</li> <li>• Bank loan</li> </ul> <p><b>STEP 2</b></p> <p>Select a Registered Solar PV Service Provider (SPSP)</p> <p>www.seda.gov.my/rpsp</p> <p>SPSP will submit the application on behalf of the applicant and will obtain NEM 3.0 approval from SEDA Malaysia</p> <p><b>STEP 3</b></p> <p>Get solar PV system installed</p>	<p><b>Leasing Method</b></p> <p><b>STEP 1</b></p> <p>Financial Model</p> <ul style="list-style-type: none"> <li>• Solar Power Purchase Agreement (PPA)</li> <li>• Solar Leasing Programme</li> </ul> <p><b>STEP 2</b></p> <p>Select a Registered Solar PV Investor (SPI)</p> <p>www.seda.gov.my/rpi</p> <p>SPI will submit the application on behalf of the applicant through SPSP and will obtain NEM 3.0 approval from SEDA Malaysia</p> <p><b>STEP 3</b></p> <p>Get solar PV system installed</p> <p><b>STEP 4</b></p> <p>Method of Payment</p> <ul style="list-style-type: none"> <li>• Pay to solar investor</li> <li>• Pay to TNB via SARE (Supply Agreement with Renewed 2E Energy)</li> </ul>
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