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Solar and storage for now, nuclear for the long run, say panellists

The Edge, Malaysia

Solar and storage for now, nuclear for the long run, say panellists

BY **CHELSEA LEE JIA SHI**

Solar photovoltaic systems and battery energy storage systems (BESS) are the technologies Malaysia should deploy now to speed up its energy transition, said the panellists at *The Edge*-HSBC Renewable Energy Forum 2026.

In the panel discussion "How can Malaysia accelerate its energy transition?", the experts noted that solar power supplies renewable energy (RE) while BESS, which stores power in the banks of batteries, smoothens out intermittent solar energy production.

Syed Malek Faisal Syed Mohamad, head of renewables Malaysia at Gentari Sdn Bhd, noted that during his time in the company of more than 10 years, developers and the industry have become familiar with the process of implementing solar energy technologies such as the Large Scale Solar schemes. "For example, at Gentari ... we used to develop projects on a smaller scale ... but now, we're pursuing projects with bigger capacity."

The growth of solar energy production has exposed the need to upgrade the national grid. Traditionally, grids were built around power plants that provided steady and centralised energy. But now, they must be adapted to handle variable and decentralised RE.

Syed Malek pointed to the RM15 billion that Tenaga Nasional Bhd (KL:TENAGA) will invest in strengthening the national grid, which was announced during the tabling of Budget 2027 in parliament last month.

Jack Tan Qi Jie, CEO of business and asset management at Solarvest Holdings Bhd (KL:SLVEST), called for a more stable and modernised grid with greater capacity. Rather than focusing only on retiring plants that run on coal and other fossil fuels, the priority should be raising the uptake of RE and better managing the demand and supply of power, he said.

"For those obstacles or data centres, investors or even developers, they are looking for applicability and certainty. So, this is the area we should look into and how we can gradually increase this from 30% to 70% or 100%. This is something the topic of new capacity will be about," he added.

Tan also said the revised charges under the Corporate Renewable Energy Supply Scheme (CRESS), which imposes a fixed system access charge of 14 sen per kWh for developers and four sen per kWh for corporate green consumers, were a good move.

While consumers may not welcome the four sen per kWh charge, which is pegged to the Regulatory Period 4 (RP4) tariff and could change when RP5 begins on Jan 1, 2028, he noted that fixing the 14 sen per kWh charge for developers for 10 years would give them a hedge against price swings.

He added that artificial intelligence (AI) can help balance the grid and smoothen the flow of RE in and out of BESS. "With more and more RE, we need a stability group and also backup power, so by mixing together with natural resources or gas ... it will be a hybrid [solution]."

Clean Energy Xpeditions Sdn Bhd (Cenergy) managing director Dr Azrudin Mustapha, who also backed the adoption of BESS, mentioned the need for system marginal pricing, under which the most expensive power plant needed to meet peak demand sets the electricity rate for all generators in the network. This would allow low-cost producers to sell cheap energy at peak-level market prices and create profits for the suppliers.

Deploying BESS can resolve this systemic price inflation. Batteries can be charged during off-peak hours using cheap, efficiently generated electricity and then be discharged when demand reaches its daily high. By supplying stored power during peak windows, the grid avoids switching on the most expensive power plants altogether.

"We, the consumer, no longer have to suffer the implications of that most expensive plant. It actually results in a flatter energy profile for everybody. That creates a lot of economic benefits and economic competitiveness for Malaysia," said Azrudin.

> **"[Energy] integration is key in this case — looking** at RE resources and integrated storage to ensure you can provide a firmer supply for your users."
> ***Syed Malek, Gentari***

> **"With more and more RE, we need a stability** group and also backup power, so by mixing together with natural resources or gas ... it will be a hybrid [solution]."
> ***Tan, Solarvest***





SHAHRILL BASRI/THE EDGE

The case for small modular reactors

Nuclear energy is another source of RE that will benefit Malaysia's energy transition, providing greater efficiency and reducing emissions, but the deployment may take several years before the impact is realised.

"Nuclear is criticised for being very slow, and I agree with that. I'm actually in favour of all the good ideas above, but I just want to emphasise that although [the time taken] for the first nuclear plant to the grid will take a long time, the amount of energy you actually add to the grid will be enormous," said Azrudin.

If Malaysia is looking at a 2050 timeline, nuclear power will be the best solution as the country's energy source, he suggested.

France already has 75% of its energy mix powered by nuclear energy and boasts one of the cheapest prices of electricity in Europe. The UAE, which has deployed four APR-1400 (Advanced Power Reactor) reactors, is able to generate 4,800MW of power, he added.

"[France's] emissions is about 25g of carbon dioxide per unit of electricity. To put that in perspective, we emit 700g of carbon dioxide to boil five kettles of water — that's almost 1kg. But in France, over 10 years, from 1973 to 1983, they deployed 60,000MW of nuclear reactors," said Azrudin.

"In the UAE, we're talking about 5GW. In France, it was 60GW over 10 years. So if you're really aiming for that timeline, I would say go for nuclear [energy]."

He also shared some use cases for small modular reactors (SMRs), which are rated up to 300MW, compared with large conventional reactors of 1,000MW and above.

Azrudin explained that SMRs, which have less nuclear material inside, generate a fraction of the energy output that is expected of a large power plant and consume less water for the cooling systems.

SMRs also provide a good business case as they can optimise capital expenditure, making these an attractive choice and an alternative to large conventional reactors, he added.

Azrudin pointed out that building a large conventional reactor would require heavy upfront capital and about a decade's wait before the first unit of electricity is sold. A 1,500MW conventional reactor could take seven to nine years to build, assuming there are no delays and the infrastructure, ports and rails are in place to support the construction of the first plant.

With SMRs, that upfront wait applies only to the first 300MW unit, which can start earning revenue after about three years and help de-risk the second plant, he said.

"So when you apply for financing for your second unit, you have already approved the first 300MW. If you successfully build your second unit, maybe within 2½ years, you can build three in parallel for the next [round]," said Azrudin.

"[Then you would] have five 300MW reactors, equivalent to 1,500MW, and you can build these in seven or eight years. That's way quicker than investing in a large reactor. You use your capital very efficiently because you're funding your next unit based on the revenue from your first unit."

There are also many types of SMRs, giving many options for deployment.

"[SMRs] typically offer more exotic technologies. You've heard of molten salts, liquid fluoride, high temperature gas reactors ... those are all for the SMRs. 'Small modular reactors' is an umbrella term — it's like calling something a vehicle," he said.

Transitioning for energy security and demand

The country's energy demand profile is changing, with many data centre projects being approved and geopolitical tensions driving volatile fuel prices. Therefore, a resilient and diversified energy system is needed to secure supply and meet growing demand, said the panellists.

Malaysia has set multiple sustainability goals. The National Energy Transition Roadmap (NETR)

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LOW YEN YEONG / THE EDGE

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Azrudin, Clean Energy Xpeditions

"We have 400 communities in Sabah that are not electrified. We have the largest number of rural Malaysians that are not electrified, and the thing with Sabah is the terrain is very challenging. The grid will never get to these places, [hence] the solution is mini-grids with renewables."
Ong, Forever Sabah and LEAP





SHAHRIL BASRI / THE EDGE

targets a 70% share of RE in installed capacity by 2050.

Syed Malek said that apart from data centres, the rise of electric vehicles (EVs) is also changing the country's energy demand profile.

The need for green mobility has created 656 charge points across Malaysia, of which more than 200 are direct current fast chargers. To meet the extra load on the grid, he called for solar power and BESS to be integrated to support EV growth.

"[Energy] integration is key in this case — looking at RE resources and integrated storage to ensure you can provide a firmer supply for your users," said Syed Malek.

Azrudin said that while solar power and BESS help cut emissions, Malaysia must also develop its own technologies to secure its energy supply.

"True energy security is when you don't have to depend on foreign fuel. We're talking about importing gas, importing coal ... that's not true energy security," he stressed.

"We need to develop our own domestic technologies because energy security is not just about energy. It's about the technology to produce that energy, and without that, we're still going to be dependent on foreign geopolitical dynamics."

Grid projects in Sabah

During the panel session, Cynthia Ong, chief executive facilitator and board director of non-governmental organisations Forever Sabah and LEAP Spiral, spoke about Sabah's efforts to bring power to rural areas. She shared that Forever Sabah is working on mini-grids with renewables such as solar and hydro energy to electrify rural areas that would otherwise not be able to access the larger grid.

"We have 400 communities in Sabah that are not electrified. We have the largest number of rural Malaysians that are not electrified, and the thing with Sabah is the terrain is very challenging. The grid will never get to these places, [hence] the solution is mini-grids with renewables," she added.

Ong said that while the mini-grids have been operational, the biggest challenge has been to scale the technology to be able to service communities in remote areas of Sabah.

Financing and regulation stand in the way as one of the major challenges in making the mini-grids accessible, but progress is being made.

"We've done a road map with the Energy Commission of Sabah and Sabah Electricity. They've integrated that into the Sabah Energy Roadmap and Master Plan. We're already in process — it's at a pre-scale phase — so this will bring the whole of Sabah to universal access," she said.

"We've [also] done a demo phase of nine systems, [and they are] all working well. How do we get from nine systems to 400 systems is the big question. You're not going to make a lot of money, no one's going to get rich, but we're actually going to make the pivot to low carbon local economies in the cracks and divides of Sabah."

Another grid-related project that is ongoing is the Sabah green grid, which looks at how 133 palm oil mills with biogas and biomass can feed energy to the grid. The idea for this started when it was observed how mills were able to be self-powered but also faced energy flares that had nowhere to be channelled to.

Ong gave an example of a town in Sabah by the border of Nusantara, where it has a diesel generator with an output of 800kW and excess energy.

"When a mill nearby is flaring 1MW 3km away. It doesn't make sense [to leave it be]. We're so hard-wired towards the fossil fuel system, and I think that's going to be the major system shift that we have to make," she said.

As with the mini-grids, regulation and financing are the biggest hurdles. But the technical side, including talent and skills, is ready, said Ong. She added that her ideal future for Sabah, and for Malaysia, is a "solarpunk" one, referring to the genre of speculative fiction and art that imagines a world built on clean technology.

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