

04 OCT, 2026

WHY EV ADOPTION NEEDS SOLAR AND HOME BATTERIES

New Sunday Times, Malaysia



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CBT /Feature

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GRID SHIFT

TENAGA Nasional Bhd is the lightning rod of the day. With energy prices remaining high and unpredictable, the impact is showing up on some electricity bills as monstrous increases, with some consumers seeing their monthly costs double or worse.

Any sort of price increase, especially one that comes as a surprise, will naturally attract anger and finger-pointing. Some consumers have gone as far as accusing the grid operator of tampering with meter readings through some backdoor in the smart-meter system.

Such a delectable conspiracy theory is a crowd favourite on the internet buffet platter of things to shake your finger at, and it nearly broke the web last week.

TNB's press conferences explaining the tariff hikes sound more like a repetition of what we already know: that geopolitical tensions in the Middle East are taking everyone's lunch and there is precious little we can do about it.

As we watch warheads argue and explode, however, there is a far more interesting change happening right under our noses on the grid.

While TNB has done a commendable job keeping our grid healthy and robust, it is still powered by imported fossil fuels and operates under a regulatory framework that is desperately struggling to cope with structural change.

The advent of cheap solar and soon-to-be ubiquitous home batteries is driving this clunky transition, leaving the national grid operator to stare at its own mortality, where being a monopoly is both a curse and a blessing.

While many detractors of renewable energy would just blurt out the word "intermittent" as if it were a nervous tic, we can see just how unpredictable the global energy market can be as a result of a few loose screws in a few wrong heads.

As the global clowns argue over who has bigger shoes and louder hair, the Automatic Fuel Adjustment (AFA) mechanism drops its hammer and more than a few households have

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Electric vehicles charging at night can help soak up electricity that would otherwise go unused, easing pressure on the grid. NSTP FILE PIX

found themselves flattened by a doubled electricity bill.

In a different era with more stable energy pricing, even the seasonal threats of heavy smog and El Niño — both of which drive massive demand for energy-hungry domestic cooling and refrigeration — would result in a bill that is painful but manageable.

Suddenly, solar panels on the roof start to look like a very good idea.

Then comes TNB's introduction of time-of-use (ToU) differentiated rates for peak and off-peak periods, with peak hours running from 2pm



until 10pm.

Under this structure, anyone who even looks at their air conditioner funny during peak hours will get a good spanking from the energy monopoly.

Electrons consumed off-peak are a few sen cheaper, and suddenly ToU looks like an escape hatch from high bills, tempting many to put off installing rooftop solar for a few more years.

Under the newer ATAP scheme, the sun does not give back as much as it used to under the old Net Energy Metering framework, even if that system itself was less generous than the historical Feed-in Tariff, which could

actually turn a household into a cash-yielding power plant.

So solar does look less attractive now. But I suspect it's done on purpose, read on.

Unaware of the fine print, many rushed to switch to ToU.

ToU is hailed as the consumer's savior for modern, heavy-consumption homes and electric vehicle owners.

The pitch sounds simple enough: shift your heavy loads, like charging your EV, to off-peak night hours when rates drop to 24.43 sen per kWh (compared with 28.52 sen during peak periods) and enjoy the savings.

Except, it is largely an illusion.

First, the math simply does not hold up under scrutiny. The margin between an off-peak rate and a standard flat tariff is razor-thin: roughly 2.6 sen per kWh cheaper, while peak periods cost barely a sen more than flat rates.

If you are charging your EV at home, your reward for staying up late to plug in is a meagre saving of loose change per charge.

Worse, if you slip up and plug in during peak afternoon hours, you are hit with a rate that makes it noticeably more expensive than a flat tariff.

Sure, most cars can be programmed to draw juice only after 10pm, but sometimes we will forget to activate that mode.

But even that is not the real kick in the groin. The true trap is the magic 800kWh threshold, which is easily breached in homes running multiple AC units around the clock.

The moment you cross that boundary, crucial subsidies, exemptions and rebates vanish.

You are suddenly exposed to full service taxes, AFA surcharges and penal-tier rates.

The ToU tariff stops being a tool for savings and turns into a financial penalty for living a modern life.

Remember when I said being a monopoly right now is both a curse and a blessing for TNB?

Let's examine why.

From a grid operator's perspective, ToU pricing is designed to solve an immediate, very serious structural problem: the lack of storage.

They need a way to soak up inflexible baseload generation at night and lower rates are designed to entice EV owners to plug in only when power would otherwise be wasted.

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As EV ownership grows, rooftop solar and home batteries could help households generate and store enough power to charge their cars.



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Traditional power plants — massive coal and gas turbines — cannot simply be switched off when the sun goes down; they require continuous, predictable demand to operate safely.

At night, they run and gigawatt-hours of electricity simply evaporate into the ether.

EVs plugging in at night are the first step. The next requires grid-scale batteries to absorb daily waste. And if experts are right, a truly green grid will require up to 10 days' worth of storage.

With a target of 75 per cent renewable energy by 2045, which is not that far away, and assuming the country uses about 100GWh of electricity a day, the national storage requirement hits 1TWh.

That is a number so big it makes TNB's accountants wince.

Concentrating storage in the hands of the utility allows them to harvest nighttime electricity that

would otherwise be wasted, only to sell it back to us at expensive daytime rates.

That will just make us more angry at them.

This is why being a monopoly, which gives TNB all the money they need to install grid batteries, is actually a curse. Because if they do that people will get angry.

It is that simple. And because they know we will eventually catch on, they are quietly nudging the market towards distributed systems, virtual power plants and home storage.

Also, goading the market towards a distributed grid is ultimately the best option for the long run, even if it causes friction right now.

Think about it: water and electricity are piped into every home. The only difference is that every home has water tanks. Soon, every home must have batteries.

A widely distributed grid where everyone has solar and storage is

immensely robust, one that will not cascade from brownouts to blackouts because there is no single point of failure.

The transition to EVs is just one piece of this massive puzzle, built on physical infrastructure and regulations.

Even before ToU was introduced, the Energy Commission charted the Accelerated Transition Action Programme, which only truly rewards solar when paired with a battery.

You can see the two legs of demand management and storage deployment rolling out together, even if the general public hasn't quite realised it yet.

Although the macro plan is solid, the current reality feels like a policy contradiction.

On one hand, the government wants to encourage the electrification of transport. On the other, it penalises those who ditch petrol with aggressive tariff tiers and volatility charges.

This friction would be manageable if global energy prices weren't skyrocketing.

Electric vehicles present owners with the ultimate liberation: never having to rely on a single crude oil tanker ever again.

The only caveat is that we have to capture daytime solar one way or another.

A house with two electric vehicles will soak up around 1,200kWh of power just for the cars — roughly 20kWh per day per car, translating to about 120km of daily travel each.

Add another 20kWh per day for standard household use, and total consumption easily hovers around 1,800kWh per month.



A distributed grid of homes with solar panels, batteries and EVs could turn households into both consumers and suppliers of electricity.



To be self-sufficient, families need to figure out how to generate 60kWh to 80kWh of energy every day.

Given that every kilowatt of solar panel generates between 3.5kWh and 4kWh daily, each home should ideally feature around 20kW of solar capacity paired with 50kWh to 100kWh of battery storage, independent of the vehicles themselves.

Of course, if the grid eventually allows for seamless energy trading with minimal transmission charges, your home solar could charge your car at

the office. And at night, you could drive that massive mobile power bank back to power your home.

This is the utopia of a perfectly distributed grid behaving as an energy transport and trading platform.

Reasonable charges apply, of course. Don't get me wrong. I am in no way defending TNB or the current rate hikes.

I am simply mapping out what is happening beneath the hood, and how the cogs are being ground down and rearranged for the future.