

## ENERGY- SAVING MEASURES

THE INCREASE IN ELECTRICITY TARIFFS HAS RAISED CONCERNS ABOUT ITS AFFORDABILITY. CAN SOLAR ENERGY BE A RELIABLE ALTERNATIVE, AND WHAT ARE THE MEASURES HOMEOWNERS CAN TAKE TO REDUCE POWER CONSUMPTION?

**W**ith the increase in electricity tariffs, solar power is being considered as a potential alternative source of energy. Although the cost of generating solar power is eight to 12 times more than that produced by non-renewable energy — largely coal and gas in Malaysia — solar energy options are increasing and rapidly becoming cheaper.

"Solar power generates about 5% of the world's energy, and the government is targeting 2.8% in Malaysia by 2020," says Ahmad Shadiq Abdul Wahab, president of the Malaysian Photovoltaic Industry Association (MPSA). "The cost of generating one kilowatt (kW) of solar energy in the 1980s was RM30,000, but today the cost has been reduced to about RM6,000 per kW."

The types of solar-powered appliances available in Malaysia are for the most part limited to outdoor lighting and water heating systems. While they aren't typically available at conventional electrical appliance stores, they are produced and sold by solar energy product manufacturers. As these appliances are solar-powered, the only cost consumers incur is the purchase price.

Solar-powered wall and standing lights, which can stay lit up for up to 12 hours (and more with additional power reserve), range between RM400 and RM600 each. Floodlights can be customized according to the size of the house, and cost cost as much as RM2,000.

Solar water heating systems come at a better price, and depending on their size, range from RM4,000 to RM8,000. Other types of water heating systems include one that utilizes heat generated from air-conditioning units, as opposed to solar energy.

Despite the steeper prices of these appliances, they are

highly recommended because of long-term cost savings, according to green architect Dr Tan Loke Mun. "Floodlights and garden lightings in particular are energy gentlers, so they should be the first ones to be substituted." Using solar water heaters is also cheaper in the long run, and compared with conventional heaters of 2,000W to 4,000W, the payback period is three to four years.

"Heating is actually cooler than cooling, it's just that we don't do it as frequently," Tan notes. "The higher the temperature differential, the more it's going to cost you."

### NET METERING

Ahmad Shadiq says while solar-powered appliances do reduce our electricity bills, they are for the most part expensive as they are battery-based. In the long run, net metering to power conventional electrical appliances works just as well.

In net metering, solar energy is generated for a consumer's own use and the surplus is transferred onto a public-utility power grid. The consumer is allowed to offset the cost of power drawn from the utility. "In 2005, [the net-metering scheme] was key to commercialising solar energy when it was introduced in Malaysia. Government subsidies were given at the time; the first batch received a 75% subsidy, the second 65%, then 55%. Plus you consume directly from what you generate. This is more sensible and makes more economic sense," says Ahmad Shadiq.

Depending on a house's roof structure and orientation, the cost of solar panel installation for net metering is about RM8,000 per kilowatt peak (kWp) generated, kWp being the output power achieved by a solar module under full solar radiation.

"If the electricity bill of a house is between RM200 and RM300, the owner should install [solar panels for] 4kWp to 5kWp. A roof area of 10



sq m is needed per kW," says Ahmad Shadiq. "Assuming you spend RM2,000 for 1kWp, this will generate an average 1,200 kilowatt hour (kWh) a year. At the current domestic tariff rate of RM0.30 per kWh, your total savings will be RM360 a year. Your estimated payback period is 17½ years [RM2,000 divided by RM360], but if the government continues with subsidy rationalisation, resulting in higher electricity tariffs, net metering will become more financially attractive to consumers."

However, to utilize solar energy, consumers need to adjust their lifestyle and home activities based on the time of day. Energy-intensive appliances such as washing machines should be used in the afternoon.

"This is so that the appliance can be powered by solar energy; storing excess electricity [so the appliance can be used at night] means you have to spend more on a battery," explains Ahmad Shadiq. "This will cost you 30% more and extend your payback period. The battery price depends on its storage capacity, but it definitely won't be able to cover 100% of your electricity utilisation at night, especially if you have air-conditioners. A

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**”** AHMAD SHADIQ

### SOLAR ENERGY PRODUCT MANUFACTURERS IN MALAYSIA

- Advanced Solar World Sdn Bhd
- Alimtech Solar & Service Sdn Bhd
- Anson Solar Sdn Bhd
- Asia Solar Enterprise Sdn Bhd
- Astrotronix Energy Resources
- Green Age Solar Technology Sdn Bhd
- Green Solar Energy Sdn Bhd
- Heliosolar
- Malaysian Komertek Holdings
- Pacific Engineering Sdn Bhd
- Powerline Solar Sdn Bhd
- Proceller Sdn Bhd
- Solar Pa Ltd
- SSI, Cie Malaysia Sdn Bhd
- Sunpower Sdn Bhd
- Sunlight Technologies (M) Sdn Bhd
- Sunsource Malaysia Sdn Bhd
- Sunway Technology Sdn Bhd
- Thermal Power Wafar Pte Ltd
- United Solar (M) Sdn Bhd
- Vivosol Systems
- World Solar
- Solar Mechanisms Sdn Bhd
- YN Solar

battery [to store power for air-conditioners] would be huge and expensive, so you can wire up things such as your lights and computers to the solar panels, but only on Tenaga Nasional for the rest and have two [energy sources] complementing each other."

Net-metering subsidies were expired in 2011 by the Feed-in Tariff (FIT) programme, which is under the Sustainable Energy Development Authority (SEDA). SEDA is expected to work with Tenaga to develop a net-metering framework for a solar net-metering programme, an initiative that Ahmad Shadiq expects to see in June.

"If you and I are going to use our own electricity, there will be reduced demand for Tenaga to build big power stations, saving the country such capital expenditures and risks," he says. "However, you

cannot talk about solar power without talking about energy efficiency. You may use solar power, but why are you still using an incandescent light bulb? It makes more sense to use LED, for example, so these measures go hand in hand."

Examples of such measures include investing in energy-efficient appliances even though they may cost more. "Many people buy cheap air-conditioners, but those have fewer cooling fins, so you would spend twice the amount of money to cool the room compared with an efficient model," says Tan. "And although lighting doesn't make up the biggest portion of an electricity bill, switching to energy-efficient bulbs is a surefire way to save money. Those who are still using incandescent bulbs (60W) should change immediately to compact fluorescent lamps (13W). If you are still using halogen lights, throw them away. They are very hot and increase room temperatures."

Materials used in the construction of a house also play a big part in cooling its interiors, which makes up the bulk of a household's energy consumption. According to Tan, the roof is the biggest issue to address, as 60% to 70% of the heat inside a house comes through the roof.

"The first thing I would do is insulate the roof with rockwool and air — mass with air inside is the greatest insulation," he says. "It costs RM2,000 to RM2,500 to insulate the entire roof of a terrace house. It's the easiest measure with the fastest cost return, but the law doesn't [make insulating the roof mandatory], so most developers don't do it. However, it's hard to insulate the roof once a house is completed."

If homeowners choose to have glass panels instead of walls to take advantage of natural light during the day, double glazing or low-emissivity (low-E) glass helps to reduce heat from going through.

"Double or triple glazing and low-E glass let daylight in without the heat," explains Tan. "Single-pane glass is the worst, because the heat goes straight through."

While low-E glass once cost 40% more than single-pane glass, a higher demand for it today has reduced prices to only 10% or 15% more. If homeowners are unable to change the glass panes of their homes, it helps to add window awnings or use solar-reflective paint for the walls.

"Landscaping also helps a lot; Malaysians love to concrete their porch to park their cars and reduce garden maintenance, but this increases the temperature around the house by three to five degrees Celsius when the sun heats up the concrete," says Tan.

"So, what you need to do is plant trees around your house. You might have a problem with water consumption if you water the plants every day, so you need to plant native trees that can survive in our climate even if you don't water them. Greenery around the house really helps." ■

## GREEN BUILDING INDEX

The Green Building Index (GBI) was developed by the Malaysian Institute of Architects (PAM) and the Association of Consulting Engineers Malaysia (ACEM). Launched in 2009, the index is an environmental rating system for buildings based on six criteria: energy efficiency; indoor environment quality; sustainable site planning and management; materials and resources; water efficiency; and innovation.

The GBI is fundamentally derived from existing rating tools, including the Singapore Green Mark and the Australian Green Star system, but extensively modified for relevance to Malaysia's tropical climate, environmental context and cultural and social needs. Homebuilders and property developers have to apply for a GBI rating.

Architect Dr Tan Loke Mun's house was designed to meet the criteria set out in the index. The temperature in his home is 25 to 26 degrees Celsius without the use of air-conditioners.

"I built a very large, flat insulated roof, and the windows face north and south, while the east and west walls are blank walls to reduce the sun's heat from coming in," says Tan. "I've also got wind turbines on the roof, with glass tubes that extend from the roof into the house. When the temperature inside the house is three degrees Celsius higher than outside, the turbines turn and suck out the hot air inside, creating a breeze." ■

