

Tuesday May 24, 2011

Power up, cleanly

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Electricity generation is being made a little bit greener with the new feed-in tariff law.

BY the end of the year, Malaysians with landed homes can start to generate electricity using their rooftops – and get paid for it by national utility company Tenaga Nasional Bhd (TNB). This is made possible under the latest push to uphold renewable energy as the “fifth national fuel”.

This push, possibly creating thousands of “independent power producers” along the way, is a likely outcome with the implementation of the feed-in tariff (FiT) system aimed at stimulating the development of renewable energy (RE). FiT works by paying a premium (above what fossil fuel power plants get) for electricity generated from non-fossil fuel sources such as geothermal, mini-hydro schemes and biomass, to name a few.

The push for RE makes sense as Malaysia pledged in 2009 to reduce its carbon intensity by 40% (from 2005 levels) by 2020. A country’s carbon intensity is measured by tonnes of carbon dioxide (CO₂) generated for each gross domestic product (GDP) dollar it chalks up. Regardless of the source, all renewable energy projects are designed to minimise emission of greenhouse gases like CO₂ by avoiding or minimising the need to burn fossil fuels for electricity.



Harnessing free power: Workers installing solar panels on the rooftop of the Nanjing South Railway Station in Nanjing, Jiangsu province, China. Production of solar power is expanding worldwide. China, for instance, has more than doubled its target for solar power capacity to 50 gigawatts by 2020.

The use of agricultural waste or biomass for power generation is widely practised, with those in the agro-based industries being best-placed to tap into this source. For example, there are approximately 400MW (megawatt) of installed capacity (albeit off-grid) put in by palm oil millers for their own internal consumption, mainly by burning mill waste. Fermentation of agricultural waste to produce biogas also holds promise, with TNB, Sime Darby Plantation and Mitsui & Co Ltd recently signing a memorandum of understanding to study the feasibility of biogas projects at Sime-owned palm oil mills.

As for mini hydro schemes, more than a dozen are running at the moment, though their weakness is that they tend to be located in isolated areas, which makes it far from the nearest interconnecting point to the grid.

Despite the seemingly wide choices of renewable energy, solar photovoltaic (PV) appears to be the only feasible option for the average Joe as other alternatives demand high start-up costs and have logistical constraints (like location, in the case of mini hydro projects). With its location near the Equator, Malaysia gets around five to six hours of optimal light each day for PV electricity generation, regardless of whether the PV modules are mounted on rooftops or the ground.



These terrace homes in Heerhugowaard, The Netherlands, have photovoltaic cells on their roofs. Such solar townships are sprouting all over Europe; hopefully, the same will happen in Malaysia, with the introduction of feed-in tariffs.

Given that rooftops are “dead space”, using them for solar power generation appears to be a no-brainer. In reality, however, the market has been slow to take up the idea despite years of incentives, especially under the completed Malaysia Building Integrated Photovoltaic project (MBIPV). When it was unveiled six years ago, the MBIPV project aimed to increase the capacity of PV technology applications in buildings by 3.3 times while reducing the technology unit cost by 20% from the baseline. Through the Suria 1000 programme, MBIPV provided grants to homeowners and companies to partially finance installation of PV systems, with the grants awarded through a bidding system. About 100 buildings have benefited from the project, with the latest being Tesco Kulim, the country’s first hypermarket to be fitted with PV modules.

The most obvious reason for the slow uptake of solar PV is cost. Generally, PV electricity costs three to five times more compared to electricity from conventional sources. A homeowner who wants to install a rooftop system with a capacity of 4kWp (kilowatt peak) can expect to fork out no less than RM60,000, based on current prices for PV modules and related accessories. A single kilowatt of installed capacity is around RM15,000, which is a lot cheaper than the figure of RM31,410 per kW in 2005.

The other side of the “expensive PV cost” coin is that consumers are not paying the real cost of electricity, given that tariffs are massively subsidised, both directly and indirectly (through cheap natural gas from Petronas), said Ahmad Hadri Haris, chief technical advisor to the Renewable Energy National Project Team, which comes under the Ministry of Energy, Green Technology and Water (Kettha).

Power push

The passing of the Renewable Energy Act 2010 and Sustainable Energy Development Authority Act 2010 in April allows for the introduction of the FiT system. Once the Acts are gazetted – said to be next month – the Sustainable Energy Development Authority (SEDA) will be established to implement FiT, most likely by the third quarter of the year.

The FiT scheme encourages adoption by bridging the cost gap between RE and fossil fuels. Its two most important features are that participants are guaranteed access to the grid (can export electricity at any time they wish) and the power distributors (mainly TNB in Peninsular Malaysia) will sign long-term contracts to buy the electricity produced at prices that are favourable to the producers.



Because of governmental subsidies, consumers are not paying the real cost of electricity. — AHMAD HADRI HARIS

According to Kettha, on a cumulative basis, FiT can help Malaysia slash some 46 million tonnes of CO₂ from the power generation sector by 2020 if the country manages to generate at least 3,000MW from RE sources by then. If Malaysia can bump up its RE capacity to 7,000MW (a target for 2030), it could theoretically save 166 million tonnes of CO₂ from being produced.

The current capacity of 62MW is already short of the target set for RE under the recently concluded Ninth Malaysian Plan (2006-2010), where it was envisaged that there should be 350MW coming from RE last year, mainly through the Small Renewable Energy Programme that kicked off in 2001. In spite of the massive shortfall, which has been acknowledged by the Government as due to “poor implementation”, it is aiming to hit 219MW of RE capacity this year, with PV to contribute 29MW.

However, with little time left after the gazetting of the RE Act, it is certain that this year’s target for RE is not going to be met either. Hadri, who reports to Kettha, is optimistic that next year’s projections of 328MW will be met, given the interest shown by the market since the passing of the Act.

Premium pricing

Only RE schemes of 30MW and under qualify for the FiT scheme. The electricity will be sold to the utility at a fixed price for a specified duration. Solar power will command a greater price per kWh compared to those coming from other RE sources like biomass, landfill gas, biogas and mini hydro.

As far as biomass burning is concerned, it is oil palm plantations that are best-placed to tap into FiT. The Penang Government is considering tapping landfill gas from its 33ha Sungai Burung landfill for electricity generation in about two years’ time (though it may not necessarily elect to embrace FiT). A company that is much closer to benefiting from FiT from landfill gas is Cypark Resources (crbenv.com), which is already capturing methane from the landfills under its management.

FiT will enable homeowners to receive up to RM1.78 for each kWh they sell to TNB. Homes with installed capacity of up to 4 kWp will be paid RM1.23 per kWh, while those generating above 4kWp (capped at 24 kWp) will be paid RM1.20.

“However, with the bonus criteria such as installation of solar PV in buildings or building structures (rather than stand-alone ground-mounted ones), they will be paid an additional 26 sen on top of the base payment,” said Hadri.

PV modules that are integrated into the building facade or structure will also score bonus points, getting an additional 25 sen. They will get another three sen if the PV modules are locally manufactured or assembled.

Industrial producers like Cypark can expect to be paid less under the pricing formula, which is skewed towards rewarding small-scale producers like individual homeowners. A (commercial) solar farm with capacity above 1MWp and up to 10MWp, will get 95 sen per kWh only (excluding bonus rates).

Regardless of ownership, Malaysia’s FiT framework will guarantee all solar power producers an income for up to 21 years. “Under FiT, consumers producing 4kWp of electricity at home can earn more than RM700 (gross) a month, and it can function as a secondary income generator,” said Hadri.

This is a welcome change compared to what homeowners are getting under the MBIPV project – they get no cash even if their electricity production exceeds their consumption.

To date, around 100 homeowners have fitted PV modules in their homes, especially under the United Nations Development Programme-sanctioned MBIPV. At the end of last year, the total capacity installed was 1.51MWp, which includes 468kWp of grid-connected PV systems (mainly demonstration projects).

Grid stability

Managing the contribution of RE into the grid over the next few years is not expected to pose any special challenge to the peninsula national load dispatch centre (NLDC) managed by TNB, due to its current minuscule percentage in the overall equation. Furthermore, RE generators larger than 30MW are subject to the Malaysian Grid Code, whereby they must inform NLDC in advance if they are unable to generate power for the next day or at other specified reporting timelines.

On the other hand, RE generators smaller than 30MW are subject to the Malaysian Distribution Code, which manages the planning and operation of the distribution network. These codes are meant to ensure that NLDC, along with their counterparts in the regional control centres, are able to ensure sufficient and reliable supply to everyone.

According to the Energy Commission, peak hour demand is still best met by hydropower and open-cycle gas turbines as their output can be easily scaled up (within seconds for the former, and 30min for the latter) to match variations in the loadings

placed upon the grid at different times of the day, unlike coal or nuclear plants which function best as base load stations (their outputs are not easily varied to match variations). The limitation for PV would be the amount of sunlight it gets, with practically no output during rain, or disrupted output on extremely overcast days. However, Hadri contended that it is unlikely that the whole of Peninsular Malaysia would get rain or face cloudy days at the same time.

The big problem is finding the money to pay the premium for RE producers, and this is expected to take place within a context where a tariff adjustment is long overdue. For a start, there is supposed to be a 1% surcharge in the electricity tariff for the purpose of funding the growth in RE.

“Without the 1%, FiT certainly cannot start as there would be no fund to pay for it,” said Hadri. However, going by the official statements from Kettha and other senior government officials, any tariff increase will still mainly be driven by rising fuel costs, and this has been communicated many times over the past few years.

In spite of being off-target, project proponents argue that any achievements in RE still serve a noble cause, no matter how minuscule. As Hadri puts it: “Any start is still a good start.”

> *Those wishing to fit solar PV modules can get more details from www.mbipv.net.my.*