

Renewable energy in East Asia

Countries should strategise the development of renewable infrastructure to suit the conditions of local contexts, says **KEVIN PUNZALAN**

WHILE East Asia continues to rely primarily on fossil fuels, many countries have begun to tap alternative sources of energy, including renewable sources.

Driven simultaneously by the need to find more sustainable sources of energy and the need to mitigate pollution, renewable energy (RE) has become an attractive option. The following sections illustrate contemporary RE developments.

Hydropower

Among the most abundant RE resources in East Asia, hydropower is actively harnessed by several countries. China relies substantially on hydropower, exemplified by its Three Gorges Project. In all, the facility aims to provide a total capacity of 22.4 gigawatts (GW).

However, not all countries in the region have chosen to focus on large-scale hydropower infrastructure. Due to environmental concerns, Hanoi has instead focused on small-scale installations that contribute to rural electrification. One notable example has been a new programme to build 37 small-scale hydropower plants in the northern provinces bordering China.

In Indonesia, high upfront capital requirements have also constrained large dams, but Jakarta has maintained plans to construct up to 570 rural mini-hydropower plants with a total capacity of 45.6 MW.

The Philippines also plans to develop small and mini-hydro plants to boost total capacity from 3.2 GW to 4 GW by 2014. However, the El Nino-induced drought severely curtailed hydropower generation on the island of Mindanao, reducing capacity by as much as 90 per cent for some dams.

Wind power

A previously under-harnessed yet abundant RE source, wind power infrastructure is expanding in both scale and scope. The Global Wind Energy Council reported in February that Beijing plans to increase capacity generated from wind to 150GW by 2020. Developments have also extended offshore: The China National Offshore Oil Corporation has announced plans to construct the world's largest offshore wind farm located outside Shandong Province within a decade.

High costs of investment deter some East Asian countries, though aid programmes may alleviate costs. Vietnam intends to use aid provided by the Danish government to fund a wind power project in Ninh Thuan province.

The Philippines pioneered the establishment of large wind farms in South-east Asia, with the first 25 MW farm completed in June 2005. The US\$50 million plant satisfies up to 40 per cent of the province of Ilocos Norte's electricity demand. Additional plants of 86 MW and 40 MW are awaiting construction. It is estimated that the Philippines has potential wind power resources of up to 7,404 MW.

Solar power

Innovations in solar power technologies have spurred a boom in installed capacity. In December 2009, Taiwan unveiled what was dubbed Asia's largest solar power plant, as part of efforts by Taipei to raise the share of solar power in its national mix.

Not far behind, China has proposed a colossal 2GW solar power plant in Ordos City, Inner Mongolia. This facility will be the world's biggest solar plant upon completion. The country has also explored concentrating solar power technology, which uses mirrors to concentrate sunlight to boil water for steam turbine generation.

In South-east Asia, several countries have invested in solar power technology. Malaysia has attracted major industrial players such as First Solar from the US and Q-Cells from Germany to supply its nascent solar industry.

The American company SunPower also develops and manufactures solar photovoltaic (PV) panels in the Philippines. In June, the Asian Development Bank proposed lending over US\$1 billion to the country for the purposes of establishing commercial solar applications, and for energy efficiency initiatives.

Thailand has also announced its intention to build one of the world's largest solar farms at Lop Buri by 2011. The plant is projected to generate over 70 MW.

Solar power has also been tapped for rural electrification in Indonesia, including a programme to supply solar power panels worth US\$84 million to 192,000 rural households.

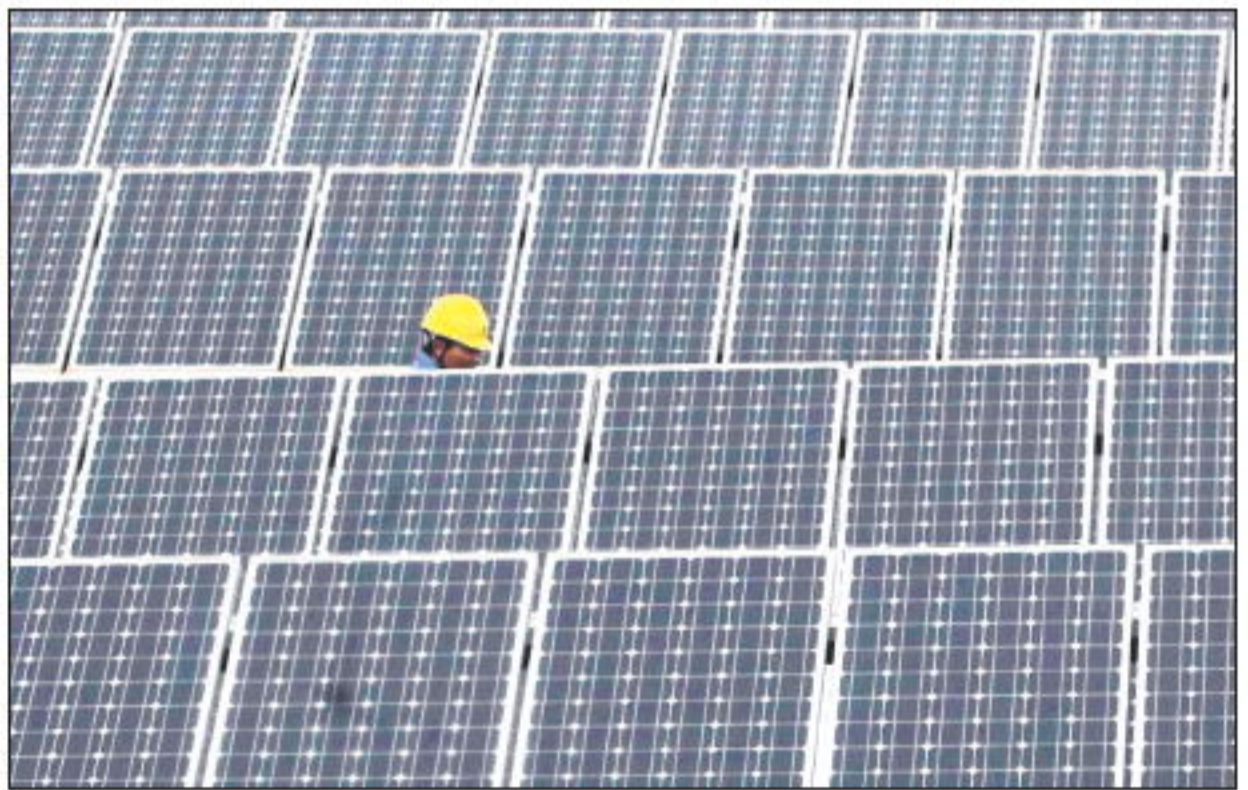
It is interesting to note that despite its space constraints, Singapore is pursuing a solar power programme. The city-state is considering the installation of 50,000 square metres of solar thermal systems by 2012.

Geothermal power

Indonesia and the Philippines have led the region in developing geothermal infrastructure. Manila, in particular, intends to expand capacity to 3.13 GW by 2013. Geothermal energy has played a significant role in the supply of power to the Philippines since the 1970s, and the country ranks as the second largest geothermal energy producer in the world.



One size does not fit all: Mr Punzalan (left) says China relies substantially on hydropower, exemplified by its Three Gorges Project (top picture). Meanwhile innovations in solar power technologies have spurred a boom in installed capacity, particularly in China and Taiwan (above)



BLOOMBERG, REUTERS

Indonesia on the other hand, ranks fourth, with untapped potential of up to 28GW. Jakarta hopes to increase generation from 1,189 MW to 4,000 MW by 2014. A consortium of foreign companies and the state electricity company completed negotiations this year to establish a major 340 MW plant at Sarulla, Sumatra.

Other forms of renewables

Compared to the aforementioned technologies, other forms of RE sources have been constrained by high costs and raw-material scarcity. Biomass is a prime example in this respect.

In the case of Thailand, it aims to utilise biomass from rice husks were stifled by the lack of feedstock. For Vietnam, biomass utilisation is hampered by high initial investment costs, as well as a lack of a policy framework.

While biofuel production has encountered barriers such as technological bottlenecks and food security con-

cerns, biofuel from waste (namely cellulosic fuel ethanol) has developed apace. Malaysia, for instance, is keen on studying the use of biomass waste for power generation.

Despite the high costs involved, South Korea has invested in tidal power. Seoul recently began construction of a 90 MW plant. Even more ambitiously, it has considered building the world's largest tidal power plant in Incheon Bay. However, environmental concerns have dogged the project since its inception.

Are renewables the future for Asia?

While East Asia has progressed rapidly in developing renewable energy infrastructure, it is clear that there is no "one-size-fits-all" approach to developing alternatives to fossil fuels. Some countries may possess abundant RE resources, but may be constrained by geography or costs.

Countries in the region should thus strategise the development of renewable infrastructure to suit the demands

and conditions of local contexts. For instance, rural communities would benefit from micro-solar, wind, or hydro installations.

On the other hand, populated islands with geologic potential could afford geothermal plants and would benefit from the economies of scale. In any case, decentralised and local solutions appear to have the greatest potential for RE applications.

Kevin Punzalan was previously a research analyst at the Centre for Non-Traditional Security Studies in the S Rajaratnam School of International Studies at the Nanyang Technological University. He is now a full-time faculty member at De La Salle University in Manila. The article was adapted from "East Asian Energy Renaissance - Nuclear or Renewables?", NTS Alert, March 2010, by Mely Caballero-Anthony, Collin Koh Swee Lean and Kevin Punzalan.



The more ticks the better: The label shows how much energy an appliance consumes in a year

More energy efficient appliances available

They form at least 50% of models at Daikin, Miele, Mitsubishi and Panasonic

By **RACHEL SIM**

THE shift towards energy efficient appliances is becoming increasingly evident and companies such as Mitsubishi Electric, Panasonic, Hitachi, Daikin and Miele are leading the pack.

Of these, all except Hitachi are taking part in the National Environment Agency's (NEA) Voluntary Agreement (VA) initiative on energy efficient appliances. To date, the four have achieved the six-month target set by NEA of introducing more 3- and 4-tick models, so that energy efficient models form at least 50 per cent of their model range.

Both Hitachi's 4-tick energy efficient inverter side-by-side refrigerator and Panasonic's energy saving refrigerators feature an intel-

ligent inverter compressor that comes with a 7-step cooling power setting. The temperature of each compartment is monitored and cooling power is optimised.

Hitachi's inverter side-by-side refrigerator also features energy saving xenon lamps.

Another energy saving option for refrigerators is Miele's MasterCool range of refrigeration which earned it a 4-tick energy efficient rating.

Despite its large size, Miele's MasterCool fridge contains a VCC compressor that runs on a variable speed taking into account the current temperature in the cooling cavity to optimise energy use.

Its high quality insulation foam and vacuum panels ensure that the fridge is kept cool without wasting energy.

Miele received the 10 per cent Energy Challenge Champion award by NEA for achieving a target of more than 80 per cent of energy efficient models in its product ranges.

Fellow award winner Mitsubishi Electric's bestselling 4-tick air conditioner uses inverter technology that adjusts capacity in response to conditions such as the difference between the outside and inside air temperatures, allowing its air-conditioners to run more efficiently and reduce energy costs.

Similarly, Panasonic's air conditioner inverter model utilises technology that uses precise motor/compressor control to reduce energy consumption in home appliances. It also features an Eco Patrol sensor that adjusts temperatures automatically depending on the number of people in the room.

Daikin's 4-tick Super Multi NX air conditioner contains a reluctance DC motor which greatly improves the efficiency of rated capacity operation, and increases the efficiency of small load operation by 42 per cent.

It also features a unique intelligent eye technology that automati-

cally controls air conditioner operation according to human movement in a room. When there is no movement, temperature is increased by two degrees, giving savings of up to 20 per cent.

Beyond air-conditioners and refrigerators, tumble dryers can also be energy efficient.

Miele's 3-tick tumble dryers rely on a patented sensitive drying system PerfectDry which uses two temperature sensors to ensure optimum temperatures during the drying process.

As exact temperatures can be maintained in various drying phases, this guarantees low energy consumption. Its large 11-litre volume also ensures improved heat distribution in drying load, thus leading to more efficient use of heat energy.

With an increasing focus on energy efficient products, consumers can now look forward to more cost savings.