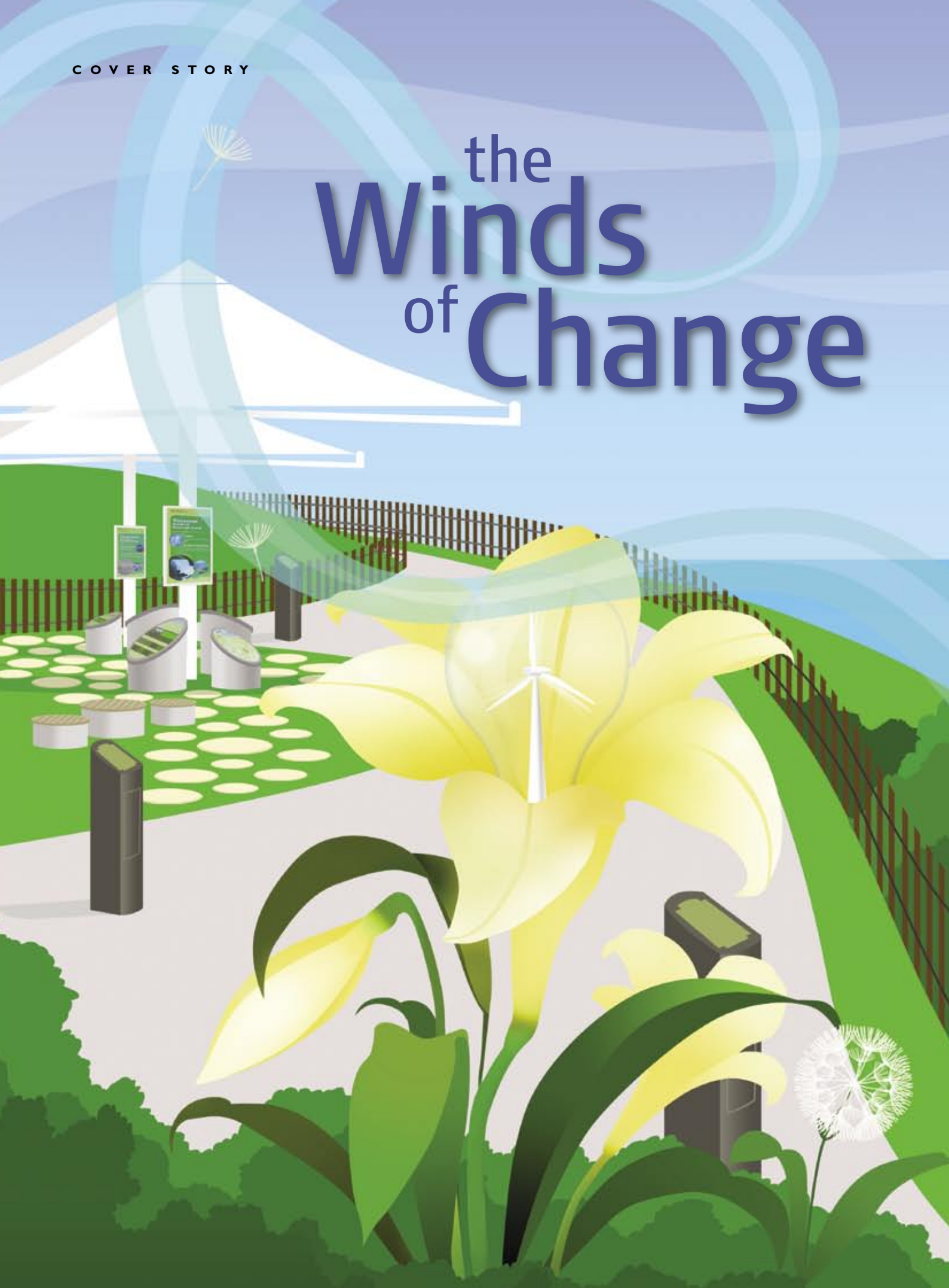
the Winds of Change



Hong Kong wind turbine is a showcase for green power

By Mark Graham

FIRST-TIME HONG KONG VISITORS – and more than a few locals – have been doing a double take recently as they pass outlying Lamma Island. The tiny island's latest attraction, clearly visible from the ocean and from the windows of planes making their final approach to the airport, is a wind turbine perched on top of a hill.

The new structure has become something of a tourist attraction, a convenient stopping-off point for people hiking across scenic hill trails, but its real purpose is more practical and educational. Hongkong Electric built the USD2 million wind turbine, known as Lamma Winds, to demonstrate a commitment to sustainable energy – the power generated is enough to support the electricity needs of a small village – and also to allow the public to learn more about the practicalities of harnessing natural resources such as the wind.

It is a fascinating topic to delve into, and one that unearths surprises galore. Even the most committed anti-fossil-fuel-burning conservationist is given pause for thought when confronted with the problems of using sustainable energy, particularly in a place such as Hong Kong where land is at a premium.

Windmills, even hi-tech ones such as this, about as far removed from the wooden-bladed Dutch model as it is possible to get, can only generate limited amounts of power; in this case at far greater expense than conventional, coal-burning means.

Shipping lane problems

The triple-bladed wind turbine can crank out about 800 kilowatts, which is enough to power 8,000 100W light-bulbs – a few strip-lights short of the energy needed to satisfy the air-conditioned needs of Hong Kong's population of 6.8 million people. Hundreds more devices, arranged in serried ranks, similar to the wind farms seen in California, or the Gobi Desert in China's remote, far-western Xinjiang province, would be needed to serve Hong Kong's needs. Given its mountainous terrain and the shipping-lane problems involved in building offshore wind farms, the city will be relying on imported fuel sources for many years to come.

Lamma Winds has made a major contribution to Hong Kong society's awareness of the entire sustainable energy issue, providing a real-life example that can be seen close up.

Simple though the concept is – the wind rotates the blades and that, in turn generates power that goes into the Hongkong Electric grid – it took meticulous planning before building could start. Officials from the company talked to local green groups and island residents about the most suitable spot for the sizeable tower, which clearly had to be located in the highest possible spot, within easy reach of Hongkong Electric's giant, sea-level Lamma Power Station.

Once the site was designated, a 20-minute hike up an access road from the plant, officials had to secure planning permission.

The beneficiary will

For all Hong Kong's reputation as a city of skyscrapers, restrictions on what can be built, and where, are surprisingly strict. Aviation height restrictions are also part of the planning-permission equation, dictating that nothing at the site can exceed a height of 165 metres above sea-level.

The wind turbine is 71 metres tall, which takes its total height above sea-level to 163 metres, a whisker below the upper limit. Its commanding height allows it to make the most of any wind that whisks across the upper reaches of Lamma Island, facilitated by the ability of the main blades to turn in whichever direction the breeze blows.

Glorious view

Visits are proving popular with school groups, in line with Hongkong Electric's mission to use the project as an educational tool. The hike up can prove strenuous, especially for youngsters

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faced with intense summer heat and a steep hill, but thousands of school children and day visitors have already visited the site, which commands a glorious view of the Hong Kong harbour channel and the main island itself. On a windy day, there is a thrilling thrum from the fast-turning wind turbine arms.

"It took about five years from it first being suggested to the actual commissioning this February, as we did detailed environmental impact assessments," says Dr C W Tso, Chief Engineer (Projects) of Hongkong Electric. "Our objective was to promote renewable energy and get experience. It is a gesture of commitment to showing our corporate responsibility. It is a pilot project to see if it is feasible and cost effective."

As a general rule, wind turbines are pricey ways of generating energy. The project costs roughly USD2,400 a kilowatt, compared to USD600-700 for more traditional fuels.

Large numbers of wind turbines sited together can result in economies of scale – assuming that there is plenty of space to put them. In Hong Kong, there are few unpopulated flat patches of land, certainly none large enough to take ranks of hi-tech windmills. However, based on the success of Lamma Winds, Hongkong Electric is already planning to build an offshore wind farm, a 100 megawatt operation either 3.5 kilometres southwest of Lamma or near the Ninepin Islands in the far east of Hong Kong waters, by 2012. The wind farm would be able to produce 175 million kilowatt hours of electricity each year, enough to supply 50,000 families.

Air quality

Other countries have had success with harnessing wind power, and the Lamma Winds project goes into some detail on this subject. Arrayed round the site are information boards listing how the world measures up in wind-power terms: As at the end of 2005 according to the Global Wind Energy Council, Germany was tops with some 18,428 megawatts of installed capacity, Spain second with 10,027, and the United States third with 9,149. Mainland China, with 1,260 megawatts, makes eighth place.

Statistics, of course, do not always give the full picture. Denmark, which does not feature in the top trio, is generally reckoned to be the wind-power pioneer.

Back in Hong Kong, residents are increasingly concerned about air quality. Despite the government claim that the local electricity sector is the main contributor to air pollution, statistics show that more than 80 per cent of pollutants in the Pearl River Delta originate from the delta itself and not Hong Kong. Despite efforts by the governments of Hong Kong and Guangdong province to clean up the air, clouds of soot and smoke still manage to drift down the Pearl River Delta, regularly engulfing Hong Kong with thick smog.

Blue skies

In the city itself, Hongkong Electric has been making strenuous efforts to reduce emissions at Lamma Power Station where a

The company has started using natural gas to power Hong Kong's energy needs

team of environmental engineers and chemists uses state-of-the-art technology to monitor and minimise the impact on the environment. Low sulphur coal is used, coal dust is suppressed and newer generating units are fitted with Hong Kong's first flue-gas desulphurisation system that removes more than 90 per cent of the sulphur dioxide produced by combustion.

The company's latest initiative is to generate more of its electricity through the use of natural gas. It is not a change that can be implemented overnight, necessitating the construction of a 93-kilometre-long pipeline to bring in the gas from the liquefied natural gas terminal in Guangdong province. The beneficiary will be the quality of the Hong Kong air and the return of blue skies.

"We recognise the need to do something about the air quality – it is an issue that concerns us," says Dr Tso. "But people have to understand it is not just Hong Kong, it is a regional issue – there is a limit to how much we can do. Having said that, we will still do as much as we can to meet community aspirations."

Positive reception

Dr Tso is gratified that Lamma Winds has received such a positive reception from the general public. As well as being a working model of green power, albeit one that generates less than one per cent of the company's total output, it is a chance to put the sustainable energy issue into some kind of perspective. Wind turbines are not realistically the way forward for Hong Kong; other renewable energy forms, such as solar power, also have limited usages in place where buildings are squeezed together so tightly. The potential of solar power is limited due to high upfront capital costs and roof ownership issues.

Even the government believes it will be possible to achieve only between one and two per cent of Hong Kong's total electricity supply by power generated from renewable sources by 2012.

Adds Dr Tso, "The main objectives of the Lamma Winds project are to acquire knowledge and experience in the design, construction and operation of wind turbines and to promote public understanding of the benefits as well as the limitations of harnessing wind power generation in the context of Hong Kong's unique situations."

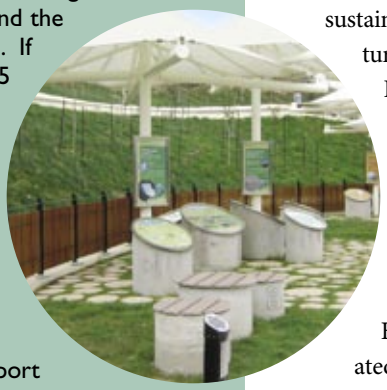
The Green Message

ON TOP OF the green energy it supplies, Lamma Winds has also generated other environmental initiatives.

Lighting in the mini-park around the base is solar powered, rainwater is used to irrigate the soil (part of which is furnace bottom ash), bricks on the walkway are made from pulverised fuel ash mixed with concrete and the seats are made from recycled pipes.

The idea was to make the project as educational and eco-friendly as possible, an instruction Hongkong Electric engineers have carried out with diligence and inventiveness.

A digital board mounted on the tower gives the technical details on wind speed and the amount of energy being generated. If the wind is too strong, exceeding 25 metres per second, it automatically shuts down for safety reasons.



Thousands of school children have already visited Lamma Winds and Hongkong Electric has established a HKD1 million Clean Energy Fund that is open to all schools and aims to support projects that raise public awareness about renewable energy.

Lamma Winds has also received support from one of Hong Kong's leading green groups. "In terms of developing renewable energy it is a good step," says Dr L K Cheng, who has conducted studies of natural energy issues for the environmental group Green Power. "It is a good starting point. It takes time for people to accept any new source of energy and with this, they can see wind-generated power first hand."