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GREEN ENERGY TARGETS NEED FLESHING OUT

My article last week on fuel mixes for power plants may have caused some controversy over the possible wider uses of renewable energy.

Let me try and explain my views on the technical issues involved. I shall leave cost and carbon emission issues to other discussions, but meanwhile, it remains doubtful that the use of renewable energy, while saving fuel costs, can offset the higher capital costs of the equipment and the larger cradle to grave carbon footprint of such devices compared to fossil fuel equipment.

It would seem, at first glance, that solar power could be an effective energy source. But even if we could cover *all* land surfaces of Hong Kong with solar cells, the total output, with present technology, would probably only be 500 MW, or 5 percent of the total generation capacity.

The two power utilities, together with the environment bureau, are mounting a gallant effort to encourage private property owners to help out, but time will tell if this can cause a real impact to total power generation capacity.

Wind power is another source, but again, the scale of operation will remain small.

Lamma Winds may have a 1MW capacity, but its operation heavily depends on the availability of winds at the right velocity.

We must also note that, for an island the size of Lamma, this is the one and only location where a wind power generator can be installed.

Hilly terrain plus the built-up urban landscape of Hong Kong do not make it practical to expand moves into these two renewable sources of energy.

We should also take note that, for solar and wind energy setups to operate effectively, the availability of land to house large battery storage systems would be vital to ensure reliable power supply to households day and night through fine and rainy weather.

What about wave power? Unless we can build large systems outside our boundary, there is no potential for development. We have no lakes or waterfalls, and that precludes hydroelectric generation.

Another possible source is waste to energy.

Hong Kong lifestyles create a lot of organic waste, but to dispose of them in landfills does not make for practical land use. Burning organic waste not only reduces the load to the landfills but also produces power.

It would be wonderful to see solar, wind and waste-to-energy ventures produce some 5 percent of the total power, but even then, we need strong resolve and a lot of regulatory changes to get near this target.

We also anticipate continuous technical advances to enable the power density of such devices to substantially increase, maybe in the next 20 years, thus helping curb the global warming temperature increase to less than two degrees Celsius.

One other vital aspect is the need for reliability. Most renewable energy sources are weather-dependent, but power demand usually rises during bad weather, aggravating the shortage.

To make renewable energy effective, we need a huge storage system (a huge bank of batteries) or a large reserve of generating power ready to meet demand. Neither of these is applicable to a city with very high power demands and a small geographic footprint.

An analogy of the widespread use of renewable energy in a city is like a diet change for meat-eaters. There is no dispute over the merits of a vegetarian diet, but supply issues, eating habits and taste preferences make such a change rather challenging.

It is an ideal target, but the path to it will be long and full of obstacles.

For now, we must accept that fossil fuels and nuclear power will still be a part of our power generation scene for a long while.

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure