



A combined-cycle gas turbine at Hongkong Electric's plant on Lamma.

LACK OF SPACE LIMITS GREEN POWER HOPES

Electricity supply accounts for two thirds of total energy here. In deciding which fuel to use to produce power, it is vital to ensure a stable supply of fuel at competitive costs and minimal pollution.

In the past, oil was used as it was readily available and easy to transport. However, the oil crisis in the early 1970s prompted a switch to coal, with its supply being less dependent on geopolitics due to being widely available. However, it is much more difficult to transport and store.

Unlike oil, which can be pumped directly to the burners in the boilers, coal must be pulverized to powder before it can be burnt.

To ensure minimal impact on the environment, precipitators are required to remove dust.

Together with ash, a residue from the burning process, disposal is needed, often through compacting for use as a cement base or other building materials to minimize air and land pollution.

The Environment Bureau, in line with green trends, wants power utilities to re-examine their future fuel mix.

Increased availability of liquefied natural gas, with the wider use of combined-cycle gas turbine generation plants, has afforded new opportunities to use this cleaner fuel.

Like coal, LNG is easily available and transportable but costs a bit more.

Fortunately, the thermal efficiency of LNG-powered combined-cycle generation, recovering waste heat from the high-temperature gas turbine exhaust to generate steam to increase power generation, could help to offset the higher cost of this cleaner fuel.

Coal-based steam plants have a thermal efficiency of lower than 40 percent, but combined-cycle plants operate at over 60 percent efficiency.

The resulting fuel costs are therefore comparable, and the small premium seems acceptable to consumers due to far less emissions.

The planned future fuel-mix will be about 50 percent coal, 25 percent LNG and 25 percent nuclear. We are blessed



Nuts and bolts

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with the availability of nuclear power from Daya Bay and have the chance to increase the nuclear power portion for best emission and costs, but for the Fukushima incident some 10 years ago.

We must note that the Fukushima nuclear plant used boiling water reactors, not the pressurized water reactors with separate circuits for nuclear and steam cycles of most modern nuclear plants.

With far less risk of radiation leaks, these are far safer and have no known record of failure. But the fear remains and will take time to eradicate.

To quote City University president Wei Kuo, a renowned expert in nuclear engineering, "many people fear ghosts but there has not been any scientific proof that ghosts actually exist."

It is sad that a stringently controlled but safe system cannot be widely used for fear of risks that are most unlikely to occur, and we pay the price for accepting this unwarranted fear.

Readers will note that I have not mentioned renewable energy. I am in full support of it, but I am also aware of space limitations in Hong Kong.

The present technology for solar and wind power requires a lot more space if renewable energy is to make a significant contribution.

The use of waste-to-energy, with a working example in T-Park, and the promotion of feed-in tariffs for roof-mounted solar power devices, sets a good example, but my guess is that it will take a long time to achieve even a 5 percent portion of the total fuel mix.

Until then, coal-fired power may still be our main source of energy, so we should use more efficient appliances. We owe it to ourselves and future generations. If nothing else, it will at least reduce spending on energy.

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