WHAT A MESS!

The need to think progressively over New Zealand's ageing power network is becoming increasingly urgent, says Ian Bywater

NEW ZEALAND has a rich and glorious past as a country using renewable energy – wonderful hydro resources as well as geothermal fields. This all began to fall apart when a huge natural gas field was discovered in the 1970s (Maui) and large volumes of this gas were burnt for electricity generation as if there was no tomorrow.

Electricity is the oxygen of the digital age and our economy, so if it falters or fails, the economy will suffer. The market-driven and fragmented industry is playing with the country's future.

Successive governments have failed to define the statement of corporate intent for State Owned Enterprises (SOEs) correctly, and have failed also to insist on a properly devoted research and development programme to bring forward new technology in the industry.

The industry does not know what to do. Separate participants cloak details of developments in commercial sensitivity so as not to reveal what they are doing to competitors. Those of us who do know what to do lack the clout and financial resources to bring forward the solutions. Add to this the severe contractual effort and waste of energy, caused by the continuous fight between network operators and generators as to who gets the highest annual profit, and chaos prevails.

Here are some salient facts seldom given the attention they deserve:

- The losses in the distribution system are up to 20%, particularly at times of peak load. The causes of these losses are power factor, unbalanced load and losses in the neutral, and I2R losses in overtaxed and ageing distribution network equipment.
- No attempt has been made to research the effect of poor customer load factor on the delivery system (load factor is the ratio of average demand divided by peak demand). This is a fundamental reason for excess generation and excess capacity. Cyclic load management, as practiced in Florida, has saved some 800MW in generation capacity.
- New Zealand's networks are ageing fast, as are most networks in the developed world. They are only a delivery mechanism. They were not designed for bidirectional flow and multiple-point generation sites at the lower voltage levels.
- Above all, customer metering systems give no idea of time-of-use of power and energy. Hundred-year old technology is still in use! While the telecommunication industry advances, the culture and structure of the electricity industry remains static. Modernisation of metering and customer load management is a priority.

The Centre for Advanced Engineering (CAE) in New Zealand has exposed the issues of how distributed generation (DG) or 'embedded generation' or 'decentralised energy' resources and demand response can play a part in solving the problems. Its workshops have brought international speakers into a forum with leaders in the industry to debate the future of an electricity system beyond the era of centralised generation facilities, thus influencing the establishment's mindset.

We have become comfortable with the idea of electricity being generated at big plants in far-off places, delivered on a network of lines that criss-cross the land. The cancellation of a large hydro power development (Project Aqua) and the lack of investment in the national high-voltage grid highlights the need to contemplate alternative models. Project Aqua will mark the end of an era, but there is no need to panic. There are alternatives to the centralised model we've grown up with. The key is to accept the idea of an energy supply system that looks very different to the one we know today.

Studies by CAE show that DG has the potential to meet 40-60% of New Zealand's demand growth. The key requirement for this to work is a formal market structure to cater for the integration of DG solutions. Good examples of DG are already seen in New Zealand. Much more, however, can be done. The DG approach allows for a diversification in the use of primary fuels (coal, gas, diesel, oil, biomass, etc.), which, in turn, allows major users to manage their energy supplies and costs by 'fuel-switching'.

This is a critical issue for the future of the New Zealand economy and the well-being of all New Zealanders. It is time to gather the forces for change and enter the new era. ■

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