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Dr Neil Byron
Presiding Commissioner
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ENERGY EFFICIENCY INQUIRY
SUBMISSION

Dear Dr Byron
Please accept the following brief submission, which has been assembled in some haste as I have only just been made aware of your inquiry into this important topic.

If you or your officers would like clarification or further information on the following or other issues, please do not hesitate to contact me at the Townsville address noted above or by email.

Yours faithfully
Philip S. Clark

BACKGROUND
Although now retired, my earlier responsibilities included managing energy utilization and expense for my Australian multinational group employer – electric power, gas and compressed air. The group comprised more than 100 operations around the world, each individually responsible for managing their own energy utilization and expense.

Centralized reporting of energy use and expense enabled focus and effective remedial action on identified gas and electric power energy inefficiencies, and enhanced the energy management information available to individual operations.

Recognising key deficiencies in supply authorities' metering and provision of tariff and technological information, I developed (with JME Computers P/L) advanced computer-based metering systems which were attached to supply authorities' gas, power and water meters to provide comprehensive demand and utilization information, enabling energy use and expense to be optimized by individual user enterprises.

I was a member and president of the Energy Managers Group (Melbourne) and have in past years been invited to address State Electricity Commission and Gas & Fuel

Corporation of Victoria major customer seminars, with particular emphasis on effective maximum demand management.

SUMMARY

I am disappointed at the minimal input to your inquiry of end user information and needs, of relevant analysis of peak electrical and gas load demands between e.g. industrial, commercial and domestic sectors, and of water heating, air conditioning, personal comfort-associated demands and compressed air loadings within those sectors.
The apparent lack of discussion before your inquiry of power factor as an energy efficiency issue, except the note on page 296 of your draft, poses questions of diligence.
I hope that my following notes might initiate closer analysis of these topics.

Some recommendations on labeling, time of day tariffs and metering arrangements are also discussed.

BARRIERS – INFORMATION

It would appear appropriate to initiate a study of energy generation and utilization efficiency with some analyses of peak electrical and gas load demands between e.g. industrial, commercial and domestic sectors, and of water heating, air conditioning, personal comfort-associated demands and compressed air loadings within those sectors. It is surprising that your inquiry does not appear to have elicited or obtained such apparently basic information. Is this symptomatic of an end user information malaise across the Australian energy scene? Or do energy suppliers have little if any detailed knowledge of their end user customer demands?

If the foregoing is the case, there is a perceived need to ask how energy suppliers attempt to optimise their forward business plans. Do they merely rely on a basic 'history plus percentage growth' investment approach? Personal involvement with others in repetitive ABS surveys of proposed future energy use has not convinced me that the resultant ABS reports having utility for system load planning.

Discussion of power consumption labeling proposals makes foreseeably inappropriate assumptions about end users' comprehension of the dollar significance of rated power information. This lack of information is particularly significant for the majority of industrial, commercial and government operations, with the outcome that energy expense is widely and necessarily accepted as a substantially 'fixed cost' of being in business. While it is recognized that energy expense might be a relatively minor expense for that majority, that expense *is* controllable. But without relevant information, there is no significant prospect of that being recognized, let alone acted upon. The story about '$100 bills on the ground' is a myth for all but a very few in Australia. Some anecdotal examples are provided later in this submission.

While efficient gas utilization has received quite effective attention from some supply authorities such as for example the former Gas & Fuel Corporation and State Electricity Commission in Victoria, there were and I suggest still are significant gaps between

intention and realization. In particular, these are due to information barriers – see the anecdotal examples below.

AIR CONDITIONING

On air conditioning plant, I offer the following anecdotal example of deficient end user technology and information. A major computer centre with three 150kW air conditioning compressors wished to reduce its electrical power expense, of which the most significant component was for excessive maximum demand. The high demand resulted from incorrect thermostat settings, whereby all three compressors started together rather than being staged at increasing temperature. Simple thermostat re-setting was recommended to completely resolve their problem, but the enterprise preferred to adopt an expensive computer-based control system which had been 'sold' to their management. A further downside issue of major concern related to their technical competency to successfully manage such advanced systems.

COMPRESSED AIR

While there has been appropriate focus on domestic and commercial building standards during your inquiry, it is surprising that compressed air loadings on the electrical system have not been mentioned. For many industrial enterprises, compressed air poses their most significant power loading, particularly at start-up when the compressed air system is being pressurised. Incidentally, the same constraint applies for air conditioning plant, which involves essentially similar gas compression equipment – see comment above. Compressed air reticulation system leakages pose significant loadings on the electric power supply system, but are rarely if ever monitored or corrected in practice.

To assist our optimization of reticulated compressed air utilization, we assembled a special purpose flow meter and integrator kit for insertion in the pipework, together with special purpose electrical metering equipment that could be easily applied to individual loads, such as air compressors. Recognising that few enterprises have the resources and technology to invest in such special purpose equipment, it is appropriate to consider public funding of similar units for loan installation at appropriate consumer locations.

GAS UTILISATION EFFICIENCY

It is my experience that the efficient management of gas utilization is a very low priority issue for the great majority of enterprises. While the installers of gas-burning equipment such as boilers and ovens endeavour to optimize the operation of new units, attention to efficiency often ends with the hand-over to the user. While the equipment continues to operate, it is assumed to be continuing at optimal efficiency – until there is a problem requiring attention. 'If it ain't broke, don't try to fix it.'

This 'optimalisation' assumption extends to any training and information received during start-up – it may have been given, but was it completely understood at the time, is it understood now that there is a problem, has the information been retained and accessible, has it been passed on to whoever is handling the problem now?

An anecdotal example from my experience concerns some gas-fired equipment which was generating unacceptable community noise. Investigation identified the noise as due to a continuing maximum gas burning rate, in turn due to inappropriate operation of associated equipment overloading the final burners. The inappropriate settings had resulted from some minor maintenance work and were not recognized as significant by the responsible supervisor, who was assumed to be fully trained in gas combustion technology. A further downside result was doubling of the gas maximum demand and expense for that period – an outcome which was not understood by the technicians concerned as related to the settings issue until it was explained to them.

POWER FACTOR

A number of our plants installed power factor (PF) correction capacitor banks to remedy incoming transformer overloading problems – an issue never mentioned by their supply authorities. Lower PF loads draw a heavier current load for the same useful power (kWh) loading, leading to increased transformer (I^2R) losses and wasteful heating. For the same reason, low PF also involves heavier currents and increased I^2R losses and waste in all the electrical cables right back to the power generating unit itself.

The quoted (page 283) claim of 99.8% transformer efficiency does not appear to recognise the realities associated with deficient power factor loads. It is therefore recommended that particular focus should be directed by your inquiry toward power factor management as a key factor in electric power system efficiency. This is indirectly confirmed as 'low hanging fruit' by the note at page 296.

LABELLING

Any proposed labelling of equipment should avoid wording which is functionally irrelevant for end-users, such as kW, kWh and annual kWh numbers, and focus attention on dollar impacts associated with (proposed) contemporary time of use tariff rates. A useful magnetic refrigerator sticker in the form of a simple plastic nomogram or slide rule relating hours of use for particular appliances over a range of tariff rates to dollar costs should be widely disseminated to domestic customers to improve the price signals and labelling comprehension barriers.

METERING and TIME OF DAY TARIFFS

Your recommendation for prior cost-benefit evaluation of options before adopting or mandating specific metering changes is agreed, albeit with some reservations resulting from deficient quality and quality control of past 'enthusiastic' RIS documentation.

Differential tariffs with time of day electrical metering for all customers using more than an identified amount of power, together with development of improved 'smart' metering technology *beyond the presently-available units*, to include (at least) multiple 'ripple signal' adjustment of tariff rates in response to known *and published* peak system loading levels.

Although there does not appear to have been any significant evidence presented to your inquiry about reasons for 'interruptible level' peak electrical system loads, it is presumed

that these relate to maximal air-conditioning loads associated with episodes of extremely high ambient temperatures. It seems appropriate to consider whether something similar to the Victorian 'day of total fire ban' media advertising should be adopted to advise end users and *inter alia* request appropriate action, such as increasing personal comfort air conditioning control temperatures during the predicted periods. At the least, this would enhance the limited public information on and understanding of peak load issues.

Smart meter technology should also enable application of *published* 'interruptible peak demand' tariffs during these periods.