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Assistant Commissioner
Energy Efficiency Inquiry
Productivity Commission
Locked Bag 2, Collins Street
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Dear Sir/Madam

Attention: Mr Paul Belin

TransGrid Submission to Productivity Commission Inquiry into Energy Efficiency

Reference is made to the call for submissions in response to the terms of reference from the Australian Government issued in relation to the above matter on 31 August 2004.

TransGrid is responsible for managing and developing that part of the national electricity transmission grid located within NSW. In carrying out this role TransGrid is required to meet obligations set out in relevant legal instruments including the State Owned Corporations Act and the National Electricity Code. These obligations include:

- Network reliability
- Connection Service
- Safety
- Environmental
- Wholesale Market.

While environmental sustainability is a key objective in the way in which TransGrid carries out its functions TransGrid has minimal scope to influence energy efficiency outcomes because:

- Transmission system transportation losses are very low (typically less than 3 per cent).
- These losses are essentially outside of TransGrid's immediate control.
- Efficiency of electricity production is dependent on generation technology and fuel sources used.
- TransGrid is obliged to treat all generation sources on an equitable basis.
- In terms of the efficiency of electricity used by end users TransGrid 's relationship with these users is via electricity distribution companies. In addition, Electricity Retailers have a most important role in this regard.

Nevertheless, TransGrid considers the Productivity Commission Inquiry to be of importance in taking energy efficiency management forward. Accordingly, ongoing involvement is clearly of value. In this regard a brief non-confidential submission is now provided.

I trust that these comments are of assistance and look forward to further dialogue as the inquiry unfolds. Accordingly, please feel free to contact either Mr. Philip Gall (TransGrid's Manager – Regulatory Affairs) on (02) 9284-3434 or via email: phil.gall@transgrid.com.au or Mr. Norman Jip (TransGrid's Market Regulation Manager on (02) 9284-3490 or via email: norman.jip@transgrid.com.au.

Yours sincerely

Kym Tothill
General Manager/Corporate Development

Energy Efficiency Within the Electricity Supply Industry

(A TransGrid Brief Submission to the Productivity Commission)

1. Introduction

Within the electricity supply industry there has been almost continuous attempts to improve the efficiency of the delivery and utilisation of the primary energy sources, which support and promote the standard of living, work efficiency, and lifestyle of Australians. Consequently, there has been a continuous but generally unheralded history of achievements within the electricity supply industry over the last 50 years, eg. increased efficiency of the basic electricity generation processes, and in the reduction of transmission energy losses through the use of higher basic transmission voltage levels. This has actually been manifest in a significant reduction in the real price of electricity during the last 20 years.

Much of this has been driven by the specific objective to ensure that the basic price of electricity in NSW (and Australia) remains low and provides both industry and commerce a competitive advantage in the use of energy, which, through the availability of low cost coal, has ranked consistently amongst the lowest priced in the industrialised world[1].

However, as we become more serious about achieving a sustainable future for all Australians, it behoves us all to seek an appropriate approach to reduce our overall energy consumption, and of course, to review the efficiency of both the energy conversion process and subsequent use within the whole supply train (from production to consumption).

The following discussion attempts to review the opportunities and to identify some of the issues in improving energy efficiency in an environment involving an energy market where the community and, consequently, political expectations, appear to require the continued availability of abundantly cheap energy for all Australians at all times.

2. The Concept of Energy Efficiency

Energy efficiency is a broad concept concerned with meeting customers' myriad needs for energy services more efficiently and more effectively. Essentially, energy efficiency is "doing more with less" and involves:

- questioning the need for the task;
- using the best form of energy for the task given time, cost and quality requirements,
- ensuring it is economically efficient.

Energy efficiency has been very much customer focussed. However, this does not mean it applies only to end use efficiency. Energy efficiency involves the whole energy sector from production through transportation and delivery systems to efficiency in the final use by the consumer.

Australians are reputed to be high per capita users of energy. Recent figures indicate that we rank amongst the highest per capita users in the world.

There are however clear reasons for this high ranking, namely:

- The comparatively low cost of energy by world standards.
- The presence of a significant number of energy intensive industries which Australia has been able to attract because of its competitive advantage in energy costs (e.g. aluminium and other extracted metal processing – for export)
- The increasing reliance on cheap energy to enhance lifestyles and to improve business operating efficiencies through the use of computing facilities.
- A stable political climate and an expectation of the community of the continuation of the availability of cheap reliable energy supplies, particularly as a result of market reforms.

[1] *A recent example of the situation is depicted in Figure 4: Comparison of Industrial Energy Prices 4th Quarter 2002 in 'Securing Australia's Energy Future' June 2004, page 10.*

However, over the last few years changes have been occurring both nationally and globally which have led to a renewed focus on energy efficiency. Such changes include:

- Australian industry is no longer protected against overseas industry competition.

- Many consumers have become more conscious of the advantages of more energy efficient appliances and the extent of "standby" losses.

- There are rising local and global environmental concern for issues such as the need for Sustainable Development and the Greenhouse Effect.

While these changes have highlighted the need to improve energy efficiency, it is considered that the real challenge of energy efficiency is not simply to moderate energy consumption, but to introduce improvements in a way which involves a reduction in total energy use (including the assessment of additional energy used to introduce any new technology) which is both economically viable, and enhances Australia's competitive advantage. Consequently there is a need to establish a measure, which can be universally accepted in both economic and environmental terms to adequately describe the value of savings arising from any improvements in energy efficiency.

3. The Potential for Improving Energy Efficiency

There have been a wide range for the estimates of the potential for energy efficiency improvements within Australia. However these are often inappropriately mixed with potential gains in Demand Side Management opportunities, where opportunities such as demand shifting are a viable and acceptable option in addressing the issue of the growing peak demand, rather than specifically addressing the effective and efficient use of energy.

We believe there is a lack of practical experience in this area. Estimates of the potential energy efficiency improvements are mostly "best guesses". Demand side programs involving energy efficiency programs have not reached a level of certainty as to outcome to allow for future predictions with a degree of confidence. Such programs represent a new paradigm to the Australian energy consumer who is used to having unfettered access to cheap reliable energy supplies. Obviously the confidence in estimates of energy savings potential and related costs will only come with experience in developing and implementing future energy efficiency programs.

Nevertheless there would appear to be three main areas where action can be focussed to actually achieve an improvement in energy efficiency:

- End use by the consumer, eg. in choice of conversion process, avoidance of waste or idle use.
- Delivery processes, eg. transmission and distribution losses in the case of electricity.
- Production, eg. efficiency of the conversion choices for coal and other fuels to produce electricity.

4. Overcoming Current Barriers to Energy Efficiency Improvement Programs

The assessment of the practical potential for energy efficiency improvements requires an understanding of those factors which hinder measures, which are economically feasible, from being implemented in practice. These factors may be referred to as "non-technical" or "institutional" barriers to energy efficiency. Such barriers must be overcome if major improvements in energy efficiency are to be achieved. These barriers apply primarily to the end use of energy where the market is more complex and are discussed below:

4.1 Relative Cost of Energy

With the exception of a few specific industries such as aluminium smelting, energy costs constitute a relatively small proportion of total costs for most businesses. Managers of an average Australian business would therefore be expected to be cautious about investing time and resources outside their core business activity in investigating and implementing energy efficiency measures to achieve small cost savings in absolute terms. In exploring options to reduce costs, such business managers are more inclined to concentrate on "big ticket" items such as capital and labour costs, unless the burden of achieving energy efficiency was borne by an external party or at least subsidised from outside that business.

4.2 Absence of a Market Impact

In the Australian energy market arrangements it is not clear how improvements in energy efficiency are valued. There are mechanisms in place such as the use of curtailable demand which are used by retailers to modify the impact of demand on the price of electricity at times of the aggregate peak demand but it is difficult to relate these actions to achieving significant energy efficiency improvements.

Obviously, the existing price signals and market arrangements currently do not explicitly value the full benefits of energy efficiency improvements.

4.3 Costs of Capital

In many cases consumers do not have ready access to capital to purchase more efficient equipment (more expensive). This is particularly so in the residential end use sector. Here, initial investment in energy efficiency can be seen to be large compared with significantly lower purchase costs, but higher operating costs of less efficient alternatives.

4.4 Splitting of Costs and Benefits

It is often the case that the agent who installs or owns the equipment, appliances, or the building itself is not the same agent who pays the energy bills for operating or occupying it. A simple example is that of rental accommodation. The landlord is less likely to replace an inefficient hot water system because the tenant bears the cost of the energy bills. Conversely, the tenant will not replace the system because it belongs to the landlord.

4.5 Unaccounted Externality Costs of Supply

Like renewable energy sources, energy efficiency technologies tend to have a smaller impact on the environment and human health than conventional supply of energy. Since these “external costs” of supply are not fully incorporated in the market price of energy, the resource conserving and other environmental benefits of improving energy efficiency are not reflected as a relative cost saving advantage.

Many of the options for overcoming barriers to improved energy efficiency flow directly from a consideration of those barriers. It must be stressed that many of these problems persist because their solutions are not straightforward. In addition, in the NEM, any program to increase energy efficiency can only be effective if it is coordinated and receives the support of consumers, businesses, and, in particular, the regulator.

5. Consumer End Use Efficiency Improvement

It would seem that the most effective starting point for energy efficiency improvement is at the point of end use. How much of this technical potential is cost effective and practical is a matter of vigorous debate.

The increased use of air conditioning in commercial and residential premises has been a significant component of the ongoing increase in peak demand for electricity in Australia. It should be noted that, in terms of cooling and heating efficiency, the reverse cycle processes are actually energy efficient, easy to control and adjust. and be relatively inexpensive.

In promoting energy efficiency in end use, the initial work would undoubtedly fall onto the distribution and retailing groups who have the direct end use customer contact.

Governments are also now taking a more active role in promoting the efficient use of energy, particularly in educating the wider community, and in the development of the approach from the NSW Department of Energy, Utilities and Sustainability. However the desire by government to achieve a sustainable outcome has resulted in an emphasis on Demand Side Management, with energy efficiency being one of the components (not the focus) of the proposed initiative.

Already it is recognised that the building industry, the teaching institutions (associated with architecture and building), and the various levels of government agencies associated with building Codes have responded to the initiatives of Government to seriously consider areas associated with:

- Researching cost effective, energy efficiency building and home design appropriate to the various areas of Australia.

- Developing appropriate and flexible building codes that encourage architects, builders and customers to cost effectively invest in more energy efficient buildings and homes.

- Develop control technologies, standards and protocols to enable better usage of lighting, heating and cooling systems in buildings and homes through integrated control devices.

However it would appear that further work is required to encourage and promote the simple and low cost ways of improving energy usage and energy efficiency in buildings, homes, and appliances. Examples include adjustable thermostats on water heaters, energy efficient light globes, limiting the standby power use of idle appliances and equipment, etc, obtain support of younger generation (school children) in supporting sustainability through "switch it off" programs in education facilities.

In addition it would seem appropriate to more readily provide information to assist customers with:

- increased choice of energy efficiency technology;
- a better understanding of how to use energy more efficiently, and
- greater knowledge in deciding what type of energy system to use.

6. Transmission and Distribution Efficiency

In planning the transmission network, TransGrid takes account of energy losses over the life of the system to arrive at an optimum combination of capital cost and efficiency. The existing high voltage network is about 97% efficient with some components such as large transformers achieving 99.8% efficiency. Increased dependence on power transported from other States could see a slight increase in average transmission losses over time.

Losses on the transmission and distribution networks impact on the overall energy efficiency of the interconnected electricity transportation system. The National Electricity Market operator determines economically where generating plant is dispatched to meet the next increment of customer demand for electricity, taking into account the price impacts of the marginal transmission energy losses associated with the particular options available at that time.

Whenever augmentations are needed to the transmission network there are in most cases, implicit energy efficiency gains available to the market arising from the lowering of the overall resistance of the transmission path, effectively reducing the marginal losses for a significant period of the time electricity is being used.

In determining the need for an augmentation of the network, it is necessary for the transmission owner to consider a number of impacts, including losses, in achieving a case to proceed.

- ***Interaction with the Regulatory Transmission 'Regulatory Test'***

In the ACCC's 'Regulatory Test', energy efficiency is recognised as an economic benefit. This often gets translated as a reduction in total National Electricity Market fuel costs.

However, recent changes to the 'Regulatory Test', mean that this benefit now only applies to what are termed the "market benefit" applications of the 'Test'. For reliability augmentation benefits (the majority of applications of the 'regulatory test'), energy efficiency improvements do not appear to be counted. The only factor that is considered is the installation costs of an option (that are incurred by the proponent of that option).

7. Production Efficiency

Sent out efficiency of the New South Wales power stations is reported to have improved from 33.0% in 1986/87 to about 35% by the start of the electricity market. We are all aware that, over time, technological and engineering improvements have, and continue to improve the efficiency of the basic electricity generating conversion efficiency. However, there is no driver on NEM market participants, particularly those

contemplating the installation of peak demand servicing generating plant, (i.e. the high price periods) to install the highest efficiency plant.

Behaviour appears to be driven only by a consideration of the capital expenditure needed to provide the basic increment of capacity, and there is no externality cost that reflects the "wastage" in the conversion process. This could, of course, change if there was a universal Australian carbon fuel tax or greenhouse gas emissions tax (or permit charge) which would tend to highlight the inefficiency of a poor conversion choice (even in a gas fuelled plant), even though, as an impost, it would not entirely reflect the total inefficiency issue.

However, in assessing the relative energy efficiencies of an electricity generation process, particularly as newer technologies are developed, there must be some consideration taken in the comparison process of, not only the energy conversion efficiency, but also the total energy consumed in manufacturing the particular generating facility (viz. steam generating station and steam driven turbo generator, gas turbine driven generator, wind generator, or solar panel). This initial "energy cost" should be effectively used in any energy efficiency comparison over the life of the production process. (A similar approach could be used for any downstream energy conversion process – say in the comparison of household refrigerators, rather than using only the process input energy to assess energy efficiency).

8. Some International Developments

In terms of international experiences we suggest that the Commission should be aware of a number of sources and references. These include the likes of the Electricity Power Research Institute (EPRI), and the International Energy Agency (IEA). The latter organisation undertakes policy development and analysis in energy efficiency. The IEA provides newsletter updates for individual member countries on energy efficiency[2], and has undertaken a recent workshop on this subject[3].

For some recent United Kingdom initiatives, TransGrid is aware of a number of promotional campaigns and activities. These include a new Energy Smart campaign (launched in late November 2004], which is jointly being run by Energywatch (their gas and electricity consumer watchdog [whose Chief Executive is former ACCC Deputy Chairman Allan Asher]) and Ofgem (the UK's energy industry regulator). Furthermore, the UK conducted its eighth annual Energy Efficiency Week initiative (run by their Energy Saving Trust[4] [EST]). As part of that program, the EST in conjunction with the UK Climate Impacts Programme (UKCIP), produced an authoritative report entitled, *"Forecasting the Future: changing climate, changing behaviour"*. The report also outlines simple energy efficiency measures that they believe can save UK householders up to £200 per year (or around two tonnes of CO_2 per annum) on energy bills.

The report also mentions fiscal incentives and measures.

The EST has called on the UK Government to introduce a range of fiscal commitments to make this easier and more affordable for households. In the Energy White Paper, released by the UK Government in 2002, they made a strong commitment to energy efficiency, describing it as the cheapest, cleanest and safest means of meeting policy objectives. To help achieve this, as part of the Energy Efficiency Commitment (EEC), energy suppliers offer consumers financial reductions on energy efficiency measures such as insulation, condensing boilers, low energy light bulbs and A-rated appliances.

Incentives proposed by the EST to the Government include:

1. An environmental tax or inefficiency charge on the least efficient products.
2. A proposal to the Chancellor that he should give a rebate on stamp duty to home-owners who install insulation and efficient heating systems when they move to a new home.
3. Lowering Council Tax bands for energy efficient homes to give people a financial incentive.

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[2] http://www.iea.org/dbtw-wpd/textbase/newsletters/eneff/effi_updates_all.pdf
[3] http://www.iea.org/dbtw-wpd/textbase/work/workshopdetail.asp?id=181
[4] *The UK Government established the Trust after the 1992 Earth Summit in Rio to help reduce the UK's carbon dioxide emissions.*