PRODUCTIVITY COMMISSION PUBLIC HEARINGS ON THE DRAFT REPORT " EFFECTS OF NATIONAL COMPETITION POLICY ON RURAL AND REGIONAL AUSTRALIA"

Wednesday 7TH JULY 1999

La Trobe Shire Council

La Trobe Shire thanks the Productivity Commission for the observations in its Draft Report on our Shire and the opportunity to address the Commission today.

It is particularly appropriate that the Commission has referred to

La Trobe Shire in the Draft Report as :

(a) Latrobe Valley is the regional capital of Gippsland in terms of population, administration, employment, education and recreation, and

(b) Latrobe Valley is almost certainly the most dramatic but little recognised example of National Competition Policy at work, and

(c) La Trobe Shire does not fit the normal pattern of an irrevocably declining region and, if the policy settings are right, has the capacity for renewed growth "within an NCP environment"

La Trobe Shire has suffered a dramatic turn-around due to re-structuring (not all driven by NCP) :

La Trobe
SHIRE

- **Latrobe Valley grew rapidly after 1945, driven largely by public sector investment.**

- **Over the last decade, the Valley suffered from cessation of major public sector investment, general rationalisation of activities (in common with much of rural Australia) and rationalisation and privatisation of the electricity generating industry.**

- **Over 6,000 jobs lost directly in the power industry (around 10% of our total population) and over 8,500 jobs lost overall.**

Rationalisation and privatisation of the electricity industry offers a dramatic example of National Competition Policy in action:

- Government suddenly "changed the rules" with severe disruption to people's lives and expectations.

- no evidence of planning by government prior to commencing rationalisation – virtually straight from the "21 power stations" era to stagnation.

- great risk of loss of local skills and engineering resource base

- SECV training programs discontinued and running down our human capital base

- individual generating companies have no commitment to maintenance of local "emergency response" capability – what happens when "a big crisis" comes (nb Longford gas crisis)?

Latrobe Valley does not "fit the pattern" of "high change/ low growth" identified in the Draft Report:

- Coastal location
- Close to Melbourne
- Considerable existing local critical mass in population and infrastructure
- Excellent potential comparative advantages
- Ability to sustainably support larger population and industry base

Reasons for low growth are very specific :

- **Major industry restructuring without proactive adjustment program in place.**

- **More long term structural issues in Gippsland.**

Gippsland structural problems include:

La Trobe SHIRE

- relative isolation of Gippsland/SE NSW identified in SEATS Study

- lack of critical population/infrastructure mass outside Latrobe Valley

- resulting lack of economic and political leverage

National Competition Policy must be balanced by long term pursuit of national goals:

- Services or infrastructure may be required "ahead of time" for regional development purposes.
- La Trobe Shire believes that Australia can and must recommence an active population growth targeted at regional areas.
- Gippsland, for example, has excellent resources, soils, climate and environment but is home to only 250,000 people (less than the City of Canberra) and would function more efficiently with at least four times that level.
- Achievement of such a goal requires a managerial approach to government, pursuing long term objectives in a consistent manner.

Looking to the future, we recommend two approaches; combining:

- a more managerial or interventionist approach in cases where reliance on the market at the local level may deliver perverse outcomes for the community or contrary to long term goals, and
- a follow through of National Competition Policy in those cases where it is likely to deliver appropriate outcomes.

National Competition Policy has not been fully applied to the electricity industry:

Generation has been rationalised and privatised and retailing is being progressively deregulated, however

- transmission pricing is still on a "postage stamp" basis, distorting market signals by smoothing out economic and environmental costs of transporting electricity from the power station to the terminal
- these costs are great – apart from capital and maintenance costs, considerable energy is lost in transmission (up to 10% in certain cases)
- this means that we are generating up to 10% in greenhouse gases just to warm the wires to the point of consumption
- hard to think of many other industry sectors where the market signals are hidden to this extent

In addition,the principle of COMPETITIVE NEUTRALITY is at risk :

La Trobe SHIRE

- With mixed public/private ownership of Australia's electricity industry, competitive neutrality is vital for efficient resource allocation.
- Corporatised publicly owned participants must face the same rules as privatised operators
- Major distortions can result from undervaluation of assets or capital and operating subsidies.
- National competition payments must take account of the achievement of competitive neutrality.

La Trobe Shire seeks State and National endorsement of it's "ENERGY ADVANTAGE" Program to unlock our greatest comparative advantage :

•Energy Advantage Program takes Latrobe Valley's unique concentration of generating capacity (six generators within 20 kilometres) to deliver cheaper electricity to local industry

•The program delivers:

1. An unrivalled competitive advantage for the Latrobe region, offering energy customers access to electricity up to 40% cheaper than anywhere in the country

2. A strong competitive edge for the State of Victoria and Australia in attracting "footloose" industries in competition with other regions internationally

3. Significant environmental benefits because of the major reduction in transmission costs and water use, which would ultimately benefit Australia's Greenhouse reduction strategy through a saving of up to 10% in greenhouse gasses.

The Energy Advantage Plan

•Establishing a central industrial "Energy Park" that gives customers a direct electricity supply link to the region's six electricity generators - independent of the existing transmission and distribution system. This would reduce transmission and distribution charges and enable a range of complementary industries to locate on one site with access to a secure competitive electricity supply

•Encouraging energy intensive industries to co-locate on land close to power stations owned by the electricity generators which, under existing regulations, can be exempted from the transmission and distribution-pricing regime.

•Reconfiguring the network within the Latrobe Valley so that consumers are serviced by shorter transmission lines. This would provide significant benefit for small local industry and added incentive for new industry to locate in the area.

In Summary, La Trobe Shire Recommends:

- **Level playing field for corporatised entities vs privatised entities**

- **State and national assistance in achieving Latrobe Valley's comparative advantages, especially in siting energy intensive industries**

- **In principal La Trobe Shire opposes postage stamp electricity pricing,**

- **However, we seek a win/ win solution as we are aware of the widespread ramifications of total abandonment of this long existing policy**

Summary of Recommendations (cont):

•Proactive infrastructure provision for regional growth locations
•Proactive population growth, increased targeted immigration
•Supporting Nation policies in the fields of:-
(a) Infrastructure
(b) Education, training and retraining
(c) Labour market management
(d) Housing and urban development
(e) Urban and regional research, including disclosure of the true costs of metropolitan vs regional locational decisions and the benefits of regional locations.

LaTrobe Region

Energy Advantage

STAGE ONE REPORT

A study of how the existing regulatory process impacts electricity pricing in the LaTrobe Region

A report prepared by EEA Group Pty Ltd, for the LaTrobe Shire
January 1999

TABLE OF CONTENTS

Executive Summary 3

Introduction 6

The Change in the Electricity Supply Industry 6

The Shape of the New Electricity Market 7

How the Industry Works 8

Regulation 8

NECA *10*

NEMMCO *10*

The Wholesale and Retail Market 10

The Pool *10*

Hedge Contracting *12*

The Delivery System 12

The Physical Supply of Electricity *13*

Network Pricing *14*
Transmission Pricing 14
Distribution Pricing 15
Combined Network Charges 15
Cross Subsidies 16

Energy Losses in Electricity Transport *17*
Transmission Losses 17
Distribution Losses 18

Effect of Losses on Electricity Pricing *18*

The Role of the Retailer 18

Putting It Together 19

Pricing Reviews 21

Co-Location 22

Conclusions 23

Glossary of Terms 24

Contestable Customer Timetable 25

Executive Summary

The Electricity Reform process in Australia reached another milestone with the introduction of a National Electricity Market (NEM) in December 1998. This is a further step in a process begun in 1990 by the Federal, State and Territory Governments. A summary of the events to date includes: -

- The Special Premiers conference in 1990 which commissioned studies into the feasibility of a National Grid.
- The Australian Government Industry Commission claiming the significant benefits to the National Economy that would result from restructuring the Industry.
- The establishment of State electricity markets in Victoria and New South Wales and the introduction of competition in the generation and retail supply sectors.
- Reforms by State and Territory governments which included restructuring the industry into competitive and monopolistic components, and privatisation of parts of the industry.
- The development of a National Electricity Code (NEC) that outlines the rules and regulations for electricity trading and access to supply networks.
- The introduction of a process which allows certain customers to negotiate price with different retailers and generators regardless of geographic location.

The NEM is managed by the National Electricity Market Management Company (NEMMCO) who have absorbed the role of the previous management companies. In Victoria this was the Victorian Power Exchange (VPX).

The National Electricity Code Administrator (NECA) will supervise, administer and enforce the NEC. Adoption of the NEC and amendments to it, must be approved by the Australian Competition and Consumer Commission (ACCC).
Regulatory bodies established by the Federal, State and Territory Governments will regulate the monopoly transmission and distribution network businesses. They will also control retail licensing, safety and environmental performance across the whole system.

From a generating perspective the new system forces each generator participating in the NEM, to compete for market share. This results in real competition with fluctuating prices.

Independent to this wholesale market is the electricity delivery system – the transmission and distribution networks. The NEC treats these as regional, regulated monopolies and the network fees are regulated by the State and Federal regulatory bodies. Network fees have a direct impact on price of electricity to the consumer and are set on a part "postage stamp", part "cost reflective" basis.

Overall this process is extremely complex with the emphasis on the introduction of controlled competition. There has been wide ranging input from Government at all levels and large commercial interests on a national and international level. The process has produced anomalies, which impact negatively on specific regions.

From a regional perspective, the new system does purport to provide some advantage for industry being close to generators, due to the recognition of transmission losses. However, these are not treated consistently and are shared over the relevant distribution network. The pricing regulations also consider the intensity of the electricity transport system in any particular area with penalties for long sub-transmission line systems that carry voltages, which are lower than the main transmission lines

The outcome of this system is that various companies are now responsible for the supply of electricity to consumers and these companies compete for customers. Regulation currently dictates that different geographic locations will pay different prices for network charges. Depending on the consumer's ability to negotiate the cost of the energy component, which is separate from the network charge, this means different pricing structures for similar consumers in different geographical areas. For high level users the price of electricity could now be a factor in the choice of location for new operations.

There are currently two reviews of network pricing in progress: one by NECA which is well advanced, and a draft document will be released shortly, and the other by the Regulator General in Victoria, focussing mainly on distribution network charges. Both are likely to have significant commercial implications for existing generators and customers. There is the opportunity to input a regional perspective to both of these reviews. It is imperative that any submission highlights the anomalies inherent in the current system and the net local and national benefit which can be achieved by addressing those anomalies.

There are other electricity supply issues, which are not yet resolved and not subject to such complexities at this stage. Of these, one may be of extreme benefit to Regions which are in close proximity to large base load generating plant. There is scope for generators to enter into arrangements with customers who take residence close to the generator, on land owned by the generator, and who can be supplied independently of the transmission and distribution system. This represents a real opportunity for regional economic development, but falls short of maximum competitive advantage which would flow from an "energy park" development. The "energy park" concept envisages an industrial estate supplied by a number of generators, thereby improving reliability to customers and allowing better use of existing built infrastructure and services.

There are legislative and regulatory changes that will need to be implemented, and the capital set up costs for the generators may be significant due to the need for ancillary plant. Consideration of joint submissions which outline the regional benefits and address taxation and rating issues would enhance prospects. These potential changes to the status quo, would place generators and customers in a stronger position when dealing with the distribution companies regarding elements of the network charges.

The overall effect in respect to the Latrobe Valley, is evidence of inequity in electricity price for existing and prospective industries when compared with industries in other locations. Far from providing incentive for new industry, these inequities could act against new development, and prompt relocation of existing industry, if price is the major factor. Given the proximity of the generators in the Latrobe Valley this anomalous situation needs to be targeted for change. This will require a strong case to be presented to all of the relevant parties, within the prescribed guidelines.

Any strategy to achieve overall benefit for the Region will need to involve all of the key players who have a vital interest. These include Local Government, Generators, Retailers, the Transmission Company and Customers, as well as the statutory bodies such as NECA, ACCC and the Office of the Regulator General (ORG).

The main conclusions of this study are: -

- The major element of price variation to customers, which is non-negotiable, relates to the Transmission and Distribution Use of System charges (Network Charges).
- The existing system does take account of Transmission Losses and this could favour industry locating close to generators.
- The fact that Gippsland is a large area, sparsely populated, with long distribution lines and serviced by a single distributor, generally acts against the achievement of lower network charges in the LaTrobe region, although there is scope for improvement. This would be enhanced by the construction of new distribution facilities that effectively shortened the lines servicing the Latrobe Valley.
- The high historical cost of transmission infrastructure is averaged over the area serviced by specific terminal stations.
- The individual retailer is obliged to pass on the fixed system charges and needs to spread the retail overheads across the customer base. Individual customers with high use can negotiate lower energy prices, however these are basically absorbed by other customers.
- The Regulator General is obliged to review the Network Charges every five years and such a review is currently under way. It is possible to make a submission outlining a Regional perspective.
- Location of industry in the Latrobe Region will delay the construction of new Network assets in other locations and delay investment in new generating plant, due to savings in transmission losses. This would consequently benefit Australia's contribution to Greenhouse gas reduction strategy. This is of substantial national economic benefit and should be a major consideration in any pricing review submission.
- The issue of co-location of industry with a generator could provide a significant opportunity to attract new industry to the region.

These conclusions present the opportunity to move forward on three fronts.

- **Preparation of submissions to the current reviews of Transmission and Distribution Pricing being conducted by NECA and the ORG in Victoria.**
- **Development of strategies with the major distributor (Eastern Energy) or transmission company (GPU/Powernet) which explore the possibility of a re-configuration of the regional distribution system. This may counteract the penalties for local industry associated with the current long sub-transmission lines in the region.**
- **Development of strategies with the Generators to achieve the benefits associated with co-location of industry on generating sites. This is a second level strategy which could add to the possibility of attracting major new energy intensive industries.**

Introduction

This paper aims to set out briefly the significant changes that have occurred in the electricity supply industry in south eastern Australia over the last few years. It covers the background to the changes, the effects to date of the introduction of competition in some segments of the industry, the effects as seen from the consumer's viewpoint, and in particular, the way in which the price of delivered electricity is determined.

The paper also examines the present differences in pricing which apply to consumers in different geographical locations in Victoria.

It has been prepared to give an overview of the current situation in lay terms so that its impact on the Latrobe Region Economic Development strategies may be more fully understood, and to facilitate the development of appropriate actions which will assist those strategies.

The Change in the Electricity Supply Industry

In recent decades, the state governments have owned most of the electricity supply industry. In South Australia and Victoria, ETSA and the SECV owned everything (generators, the high-voltage transmission system, and the low-voltage distribution system). In New South Wales and Queensland, there was one generating company in each state, which also owned the transmission system, and several regional distribution companies. Apart from a few minor power stations owned by, and dedicated to, industries such as Alcoa and BHP, all of the segments of the electricity supply industry were state owned, and within each state there was no competition in a vertically integrated, centrally planned industry.

The process of change began at a Special Premiers' Conference in 1990, which commissioned studies into the feasibility of a national electricity grid, which would remove barriers to electricity trading across the interconnected eastern states. (There are some formidable technical and economic barriers to connecting Western Australia and the Northern Territory to the other states, although these jurisdictions are not immune to the national competition reforms.) The Industry Commission in 1990/91 highlighted the significant benefits to the national economy that would result from -

- Restructuring of the electricity supply industry, with segments of it exposed to more commercial disciplines;
- The introduction of competition in both the generation and retail supply sectors of the electricity supply industry;
- The enhancement and extension of the existing three-state interconnected system (New South Wales, Victoria and South Australia) to eventually include Queensland and Tasmania.

The Shape of the New Electricity Market

The National Electricity Market (NEM) commenced operation on 13 December 1998. The NEM is based largely on the experience gained in the running of the state electricity markets in Victoria (since July 1994) and in New South Wales (since May 1996). It has been set up to provide for competition between generators to supply the wholesale market, and for competition between retailers to buy from the wholesale market and sell to consumers. Individual consumers who are big enough, and who feel competent enough to do so, may buy directly from the wholesale market, bypassing the retailers. Figure 1 is a diagram showing the entities participating in the market, and the relationship between them.

At present, the NEM is restricted to SA, Victoria, ACT and New South Wales, which are covered by the existing interconnected transmission system. There are 14 generating companies operating in the market, of which six based in Victoria and one in South Australia are privately owned. The other generators at this stage are still state owned, and may or may not be privatised at some future date. There are about 40 electricity retailing companies operating in the market. Eleven of these are state owned, the remainder being privately owned.

An electricity market is also operating in Queensland under NEM rules, but this is isolated from the other states until the proposed connecting transmission link (known as Westlink) between New South Wales and Queensland is built, expected to be completed in 2001.

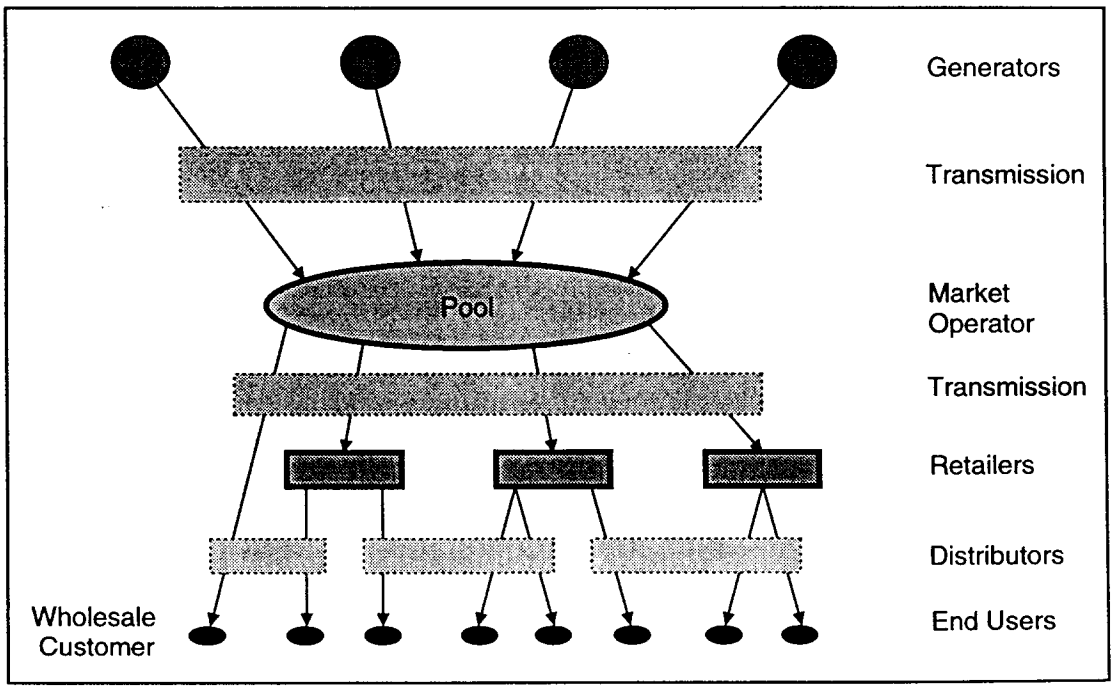

Figure 1 - Diagrammatic arrangement of the National Electricity Market
The entities in the dotted outlines (transmission and distributors) are regulated 'transport' agents. The generators and retailers are market participants, selling into and buying from the pool. The market is administered by the Market operator, NEMMCO.

To facilitate an orderly transition from a regulated to an open market, initially not all consumers were able to choose their own retailers, ie. to be *contestable* customers. The largest consumers became the first contestable customers in the Victorian and New South Wales markets, with classes of progressively smaller consumers becoming contestable at later times (Customer Contestability timetable is provided in the appendix). These contestable customers are able to shop around the retailers to obtain the best deal for the supply of electricity. Note that despite these customers being able to choose between retailers for the purchase of electricity, they are still tied to their local distributor (the "poles and wires" business) for the delivery of electricity from the market to their premises.

The decision of when the different classes of customers become contestable remains the prerogative of the individual states. It is expected that all consumers will be contestable by about 2003.

How the Industry Works

Under the National Market, the overall electricity supply industry is basically split into two parts -

- The **Wholesale and Retail Market**, which is the competitive part of the industry, covering the generation and retail segments, and
- The **Delivery System**, which is the regulated part of the industry, covering the transmission and distribution segments.

Overseeing the operation of the market are the various regulatory authorities at both national and state level. Newly created companies have been formed to administer the rules of the market (NECA) and to operate the market (NEMMCO).

Regulation

For most of its existence the Australian electricity industry was regulated by State and Territory governments. However those governments having jurisdiction over the area of the National Electricity Market have agreed that a mixture of national and state based regulation and independent pricing regulation of monopoly services will apply. As a result, the regulatory regime stems from numerous acts and involves several national regulators. Several state-based regulators are involved in each State or Territory.

The main regulatory functions are set out in Table 1 below.

Table 1 - Regulated functions and regulators in the electricity supply industry.

National Regulation	
Function	Regulator
Market conduct, Code authorisation, Network access	ACCC
Code compliance and change	NECA
Trading in electricity derivatives	Australian Securities and Investment Commission
State and Territory Regulation	
Function	Regulators (may cover more than one function)
Distribution network charges	Pricing regulators
Distribution access, licensing and compliance	Distribution service and compliance regulators
Retail licensing and compliance	Retailing and compliance regulators

In Victoria, the relevant regulator for all the above state functions is the Regulator General.

Regulation is becoming a major concern for electricity supply businesses in Australia. The issues can have very significant implications for the businesses, in terms of costs, risks and impacts on competition. Problems arise from:

- the frameworks of regulation, with the Federal Government, States and Territories all having regulatory regimes in place and/or being developed;
- the regulatory approach, which is tending from the light handed approaches promoted with national competition reform, to a command and control approach; and
- the systems under which regulation is conducted, which are considered inadequate in terms of regulator accountability and processes to facilitate balance and integrity in decision making.

These are strategic issues the electricity supply businesses are addressing through the National Generator Forum (NGF), National Retailer Forum (NRF) and the Electricity Supply Association of Australia (the national trade association).

NECA

The complex rules for the conduct and operation of the **wholesale** market have been set up by working parties with representatives from all affected states and territories. These rules are now embodied in the National Electricity Code. An independent company, the National Electricity Code Administrator (NECA) has been established to –

- manage changes to the Code,
- monitor and report on Code compliance,
- enforce the Code (through the National Electricity Tribunal),
- grant derogation from the Code (subject to ACCC approval), and
- provide a dispute resolution process.

NEMMCO

The market is operated by an independent company, NEMMCO (National Electricity Market Management Company), which has offices in all participating states. The role of the market operator is to coordinate the production from the generators in accordance with the rules of the market, and to ensure that the generation and transmission systems operate in a secure manner. The actual minute-by-minute control of the market is from either of two duplicated control centres, located in Brisbane and Sydney.

The other important role of the operator is to settle the market by establishing the market price for electrical energy in each half-hour settlement period, and determining which generators supplied how much to the market and which market customers took how much from the market during each settlement period.

The Wholesale and Retail Market

The wholesale electricity market differs from other markets because electricity cannot be stored, and it is not possible to distinguish which generator produced the electricity consumed by a particular customer. Because of this, the wholesale electricity market uses the concept of a pool where all electricity output from generators is centrally pooled and scheduled to meet the instantaneous demand.

The Pool

The electricity demands in all of the interconnected states are combined into one large pooled demand. Generators in all states offer their production to the market at whatever prices they see fit to make. An individual generator may offer all of its output at one price, or break it up into several blocks of generation, each at different prices (up to ten prices per generating unit). These prices are offered to the market at least 16 hours in advance, and may not be changed after the cut-off time for receipt of offers. The quantities in each price band may be changed up to the time of dispatch.

Since there is normally an excess of available generation over demand, not all offers are accepted at any one time. The market operator accepts the cheapest blocks of generation first, then the next cheapest, until there is enough generation to satisfy the total market demand. Because the demand for electricity varies continuously over the day, this process of acceptance of offers is repeated for each five-minute period of the day. This results in a five-minute dispatch price being determined for each reference node on the electrical system. The highest priced generator offer sets the price for that five-minute period. Generation and demand are not likely to be perfectly matched on a geographical basis, so that there will be quite often a net transfer of power from one state to another at any given time.

The marked settlement is conducted on a half-hourly basis, where the settlement price is calculated as an arithmetic average of the six five minute dispatch prices. All generators actually supplying the market in that period receive that market price for their supply to the pool, regardless of their offered prices.

Market customers (at the moment these consist almost entirely of retailers) pay the market price for all electricity that they take from the pool in each half-hour settlement period. The retailers sell their purchases to the consumers in smaller quantities.

Figure 2 shows the arrangement of the cash flows in the market.

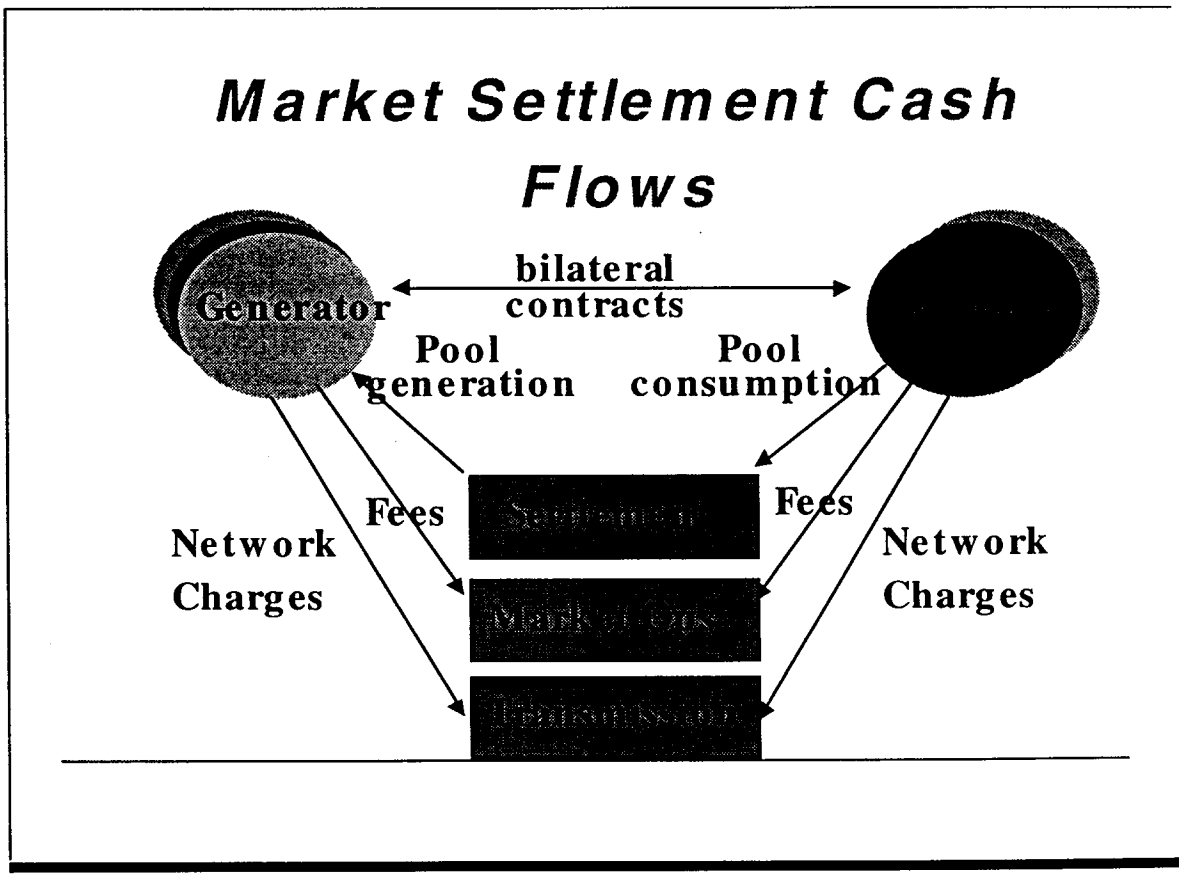

Figure 2 - Market settlement cash flows

Hedge Contracting

The demand for electricity varies continuously, depending on the time of day, day of the week, season of the year and on daily weather conditions. Generators are also not always available for operation, due to breakdowns or planned maintenance. Hence, the supply and demand balance is also varying continuously, and this gives rise to a market with quite volatile prices. In the combined interim market operating in Victoria and New South Wales during 1998, the market price varied between zero cents per kWh and almost $5.00 per kWh, despite the average price being a little under 2 cents per kWh. Prices are generally low when demand is low and supply is plentiful. When demand is high, and some generators are out of service, then prices are likely to be high.

Because of this volatility of price, generators and retailers alike are exposed to considerable financial uncertainty through their trading in the market. To minimise these risks, generators and retailers enter into hedging agreements, generally with each other, or with third parties. A typical financial instrument is a 2-way hedging contract, or contract for differences, which in effect locks in a firm price for a given quantity of electricity for both parties, regardless of the prevailing market price. Such hedging agreements are operated independently of the market, although the market price is an element required in settling these agreements.

Each retailer will have many such agreements in place with several generators, covering most (if not all) of their expected demand.

The Delivery System

To some extent independent of the wholesale market is the electricity delivery system - the transmission and distribution networks. The transmission networks (one in each state) are designed for the bulk transfer of energy at extra high voltage levels from power stations to the major load centres - cities and larger towns. The distribution networks transport the power from the transmission networks to the end users. The parties which own, or lease and operate, the different networks are called Network Service Providers in the Code. VPX and now Vencorp provide some of these services under the code to NEMMCO.

The Code treats these delivery networks as regional, regulated monopolies. Generators, retailers and customers are critically dependent on the networks which must be maintained and operated securely, and in a manner which provides open access for any market participant to trade with any other participant. The Code sets out the rules by which a network service provider must plan for the augmentation of their network, operate their network, and provide access to parties seeking connection.

The Network Service Providers receive fees for the transport of electricity from generators to consumers. Transmission and distribution network fees are regulated by the relevant state regulatory bodies. The regulated network fees are set according to principles laid down in the various state-based directives, such as the Victorian Tariff Order.

In practice, the network fees are usually paid by the retailers, who pass on those costs to their customers, the end users.

The Physical Supply of Electricity

The physical supply of electricity has not changed with the restructuring of the industry. The major generators, situated at various geographical locations, are connected to the extra-high voltage (EHV) transmission network. This network serves to transport electricity from the generators to the major centres of demand. Because the transmission system is physically a network of interlinked lines, all major demand centres are connected to all major generators. This arrangement produces a supply system, which exhibits high reliability. The shut down of a large generator (either for preventive maintenance or due to breakdown) in one location can be covered by calling on spare capacity from other generators elsewhere. The shut down of a transmission link in the network can usually be covered by the re-routing of the power flow through other links.

From selected points on the transmission network, called *terminal stations*, electricity enters the high voltage subtransmission networks for delivery to zone substations. From the zone substations, it travels along high voltage feeder lines for delivery to low voltage reticulation lines to the end users - factories, offices, homes etc. Some very large users take supply directly from the subtransmission system, others from the high voltage feeder lines. Most end users take supply at low voltage - 415 volt for 3-phase supply or 240 volt for single-phase supplies.

In Victoria, various parts of the transmission network operate at 220 kV, 330 kV or 500 kV. The subtransmission networks usually operate at 66 kV, although in some areas they operate at 22 kV. The feeder lines operate at lower voltages - 11 kV or 22 kV.

Figure 3 illustrates the hierarchy of the electricity delivery system.

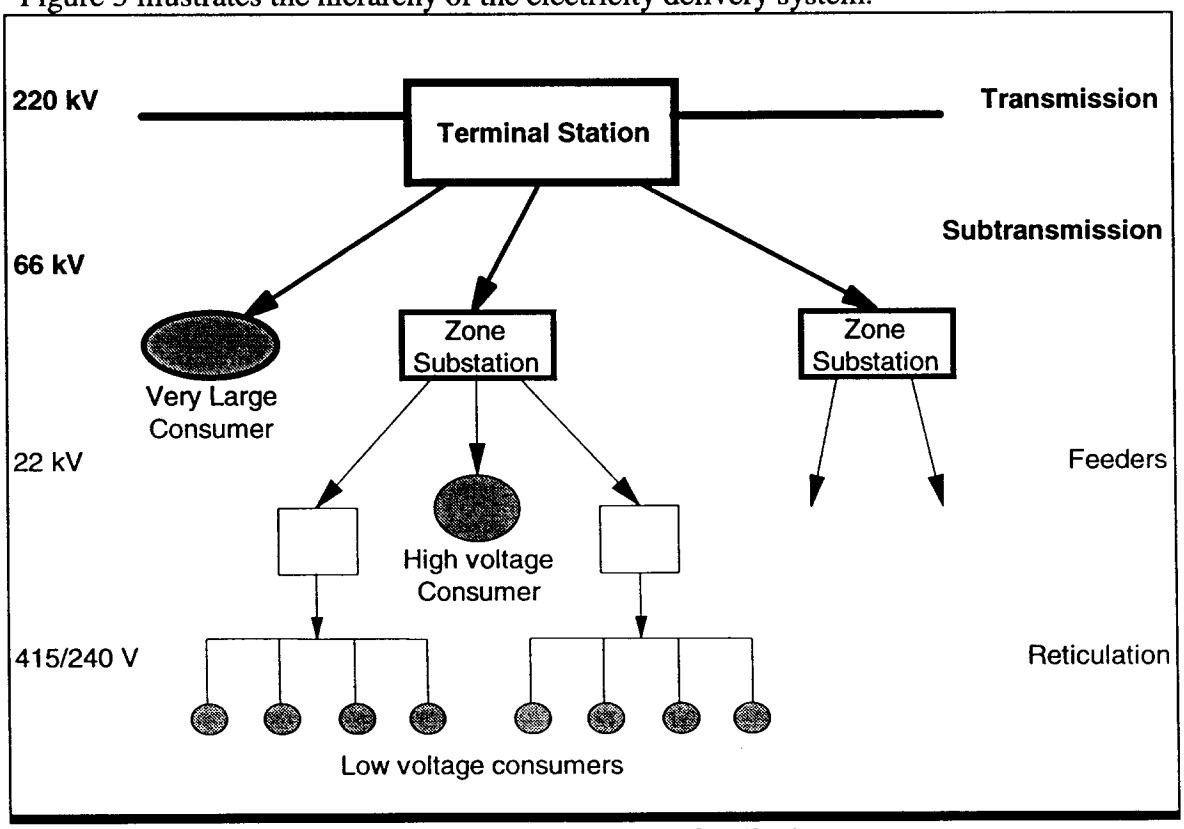

Figure 3 - Schematic diagram of the transmission and distribution systems.

Network Pricing

Transmission Pricing

The Victorian transmission network is owned and maintained by GPU-Powernet, a private company. The operation of the network is done by VENCorp (the Victorian Energy Network Corporation) directed by NEMMCO. The Transmission Company receives revenue from two sources –

- Fixed annual connection fees payable by those entities actually connected to the transmission network, ie. generators and distributors, and
- Transmission Use of System (TUOS) fees, based on actual demands and energy delivered to distributors from terminal stations.

The connection fees make up about 20% and use of system fees about 80% of the total income.

The present charges and fees are regulated by the Victorian Office of the Regulator General until 31 December 2000 under the guidelines of the Victorian Tariff Order. After that date, transmission charges in the NEM will be regulated by the Australian Competition and Consumer Commission (ACCC). The present review of transmission pricing being conducted by NECA will set the principles for pricing to be used from 2001 onwards. (However, depending on negotiations between the Victorian government and the ACCC, the Victorian transmission charges may still fall under Victorian regulation until 2003.)

The following summarises the method used to calculate TUOS prices, the way in which they are used to determine charges and the way in which the charges are billed to the distribution companies.

1 The Network Charge from PowerNet to VENCorp includes two components:
   - the Locational Component; and
   - the Common Service Component.

2 VENCorp also has costs which are recovered through TUOS charges. These relate to VENCorp's costs for planning and operating the network.

3 The Locational Component is allocated on a geographic basis to each Terminal Station which supplies load to the distributors and EHV customers using the Cost Reflective Network Pricing (CRNP) method developed for this purpose. This allocation is based on the use made of the transmission network by each Terminal Station over the peak summer period in the previous year and the cost associated with individual network elements which are required to provide the service. The allocations convey the cost of providing network service to each Terminal Station (primarily asset related) based on an optimised network.

4 These allocated locational costs are converted to prices based on average summer peak demand and summer weekday energy delivered to each Terminal Station.

5 Each distributor (and EHV customer) is billed for TUOS based on their individual contributions to the average summer peak demand and summer energy at each Terminal Station.

6 Each year, the demand and summer energy prices for individual Terminal Stations are effectively scaled to recover the PowerNet Locational Component of the Network Charge to VENCorp for the particular year and to reflect load growth forecasts on a global basis.

7 The total of the PowerNet Common Service Costs and the VENCorp Network Related Costs are recovered through Common Service Charges. The common service price is set annually to recover the total Common Service Charges based on forecast energy.

Distribution Pricing

Each of the five Victorian distribution companies sets its own Distribution Use of System (DUOS) charges, following strict guidelines set out in the Victorian Tariff Order, with the final result subject to regulatory approval by the Regulator General. Charges are revised annually.

The distributors set DUOS charges for several classes of consumer, based on whether the consumer is supplied from the subtransmission system, the high voltage feeders, or at low voltage, and also depending on the consumer's maximum demand and annual energy requirements. The charges for each customer reflect the cost of ownership and operation of the assets used to supply each class of customer. Customers taking supply at high voltage are charged less than those with a low voltage supply because fewer assets are used in their supply.

When summed over all classes of consumers, a distribution company's network charges are required by legislation to increase each year by no more than CPI - x formula, where x is between 1% and 2%, depending on the distributor. Although the distributor's increase in total network revenue is capped, the charge for any particular customer class may increase by up to CPI + 2%. A study of published network rates over the last four years indicates that most classes of large users have seen network charge increases in excess of CPI, while charges for small users have increased at much less than CPI.

Combined Network Charges

At this stage of market development, the TUOS and DUOS charges are bundled together by the distributor, so that the customer sees only a Network Charge.

The TUOS charges from each transmission terminal station which supplies the distributor are aggregated, and allocated over the total demand and energy delivered to consumers in the distributor's supply area, to give a uniform TUOS charge for all consumers supplied by the distributor.

Similarly, the distribution costs attributed to each class of consumer are averaged over the distributor's supply area, so that each consumer in a given class will be charged the same DUOS fees. This averaging of costs for each consumer class means, for example, that a large, low voltage customer in far east Gippsland pays the same network fees as a similar customer on the outer eastern suburbs of Melbourne, as both are in Eastern Energy's supply area.

The two charges, TUOS and DUOS, are combined together, so that the end user sees only a single set of charges on his accounts. These are made up of –

- a standing charge - a fixed amount per year;
- a demand charge - $ per kW of maximum demand per year; and
- an energy charge, cent per kWh of energy consumed. (This may be split between peak and offpeak periods)

The network charges for a given class of consumer will vary between distributors. This is a result of historical investment in different parts of the transmission and distribution systems, and of geographic differences - **rural distribution networks generally have a higher capital investment per customer than urban networks.** This is apparent in the rural Victorian distributors, Powercor and Eastern Energy, having higher network charges for a given customer class than the three metropolitan based distributors.

Cross Subsidies

Consumers who are further away from the generators use more of the transmission system to supply them, and the cost reflective pricing method used shows this. The TUOS charges for terminal stations in western Victoria are higher than for those in Melbourne, which in turn are higher than those in Gippsland. Again, the averaging of TUOS charges across a distributor's supply area tends to reduce the geographically influenced cost differences.

Historically, electricity in Victoria was supplied under a policy of uniform tariffs, where customers could purchase electricity for the same price, regardless of their location within the state. This resulted in a cross-subsidy from metropolitan to rural consumers. To reduce the likely rate shock of the full introduction of cost reflective network pricing, this cross subsidy remains today to some extent, with an annual payment made by the three metropolitan based distributors to the two country based distributors. As specified in the Victorian Tariff Order, this cross subsidy amounts to an annual payment of about $19 million to Powercor, and $5 million to Eastern Energy. These payments are scheduled to continue until 2020, although they will gradually reduce in amount after 2000. These payments are intended to reallocate the total calculated transmission use of system charges amongst the distributors, raising prices in the metropolitan area and reducing prices in the country.

Energy Losses in Electricity Transport

An inherent feature of any electrical transmission or distribution system is that energy is lost when electricity is transported over it. The lost electrical energy appears as heat in the conductor wires and in any transformers in the path. Generally the energy losses, expressed as a percentage of the power transported, increase with –

- increasing distance transported,
- increasing level of demand, and
- lower supply voltage.

The losses are apparent from energy accounting across the whole of the supply system. The generators supply more energy to the transmission network than the distributors take out, and the energy used by customers is less than the energy the distributors take from the transmission terminal stations. An accurate measure of losses is therefore essential to enable the equitable settlement of energy transactions in the electricity market, and also for both physical and financial planning purposes in all segments of the industry.

Transmission Losses

Transmission loss factors used within Victoria are established from historical studies of the flow of power across the network under a large number of scenarios of aggregate demands and of generator dispositions. Weighted averages of all of these loss factors are determined for each terminal station and generator. These loss factors are reviewed annually.

The particular loss factors in use under the NEM are *marginal loss factors* (MLF). The marginal loss factors are referred to a *Regional Reference Node* (RRN), which, for Victoria, is the Thomastown Terminal Station and this is regarded as the electricity centre. The price at this node is also referred to as the Regional Reference Price (RRP).

The MLF at some other location, *A*, is defined as the quantity of power that needs to be added at the RRN to supply an extra 1 MW of power at point *A*. Provided that power normally flows from the reference point to *A*, then the MLF will be greater than 1.0. However, if the power flow is normally in the other direction, eg. from a generator to the RRN, then the MLF will be less than 1.0.

For example, at Ballarat terminal station, the MLF is 1.0231, which indicates that 1.0231 MW needs to be added to the grid at the RRN to supply the extra 1 MW demand at Ballarat. Whereas at Morwell terminal station, the MLF is 0.9642. This latter value arises because the normal flow of power is from Morwell into the RRN, despite the local Gippsland supply being taken from the Morwell terminal station.

At present, the MLF used for electricity pricing in Victoria is averaged over each distributor's supply region.

Distribution Losses

Distribution loss factors (DLF) in use are average loss factors. These are calculated simply as the amount of power that the distributor takes from the terminal stations to supply 1 MW of customer demand. There are separate loss factors used for each of the different supply voltages, and whether a short or a long subtransmission line is used to supply the customer. Each distributor performs their own calculations annually, based on actual performance over the preceding year.

Distribution loss factors are expressed as numbers greater than 1.0. A DLF of 1.08 means that to supply 1 MW of power to a particular customer requires 1.08 MW to be taken from the transmission network.

Effect of Losses on Electricity Pricing

All pricing of the energy component of electricity in the market is based on the pool price at the regional reference point. It is assumed that the market exists at the reference node. This means that generators are responsible for the losses incurred in transporting their product to market, and retailers are responsible for the losses in transporting energy from the market to the customer. The following example illustrates the principles involved.

Example - Assume a customer has a requirement for 1 MW of electricity in a particular one hour period, ie. 1 MWh of energy. The market price (at the reference point) over that period is $30 per MWh. The DLF is 1.08, and the transmission MLF is 1.05.

Because of distribution losses, the retailer has to buy 1.08 MWh from the terminal station; because of transmission losses, he has to buy 1.05 times this amount from the RRN, or 1.134 MWh. This costs the retailer $34.02; but because the customer has purchased only 1.0 MWh, the effective cost of supply to the customer of that MWh is $34.02.

Additionally, the retailer has to pay fees to the market operator and a government levy. These fees and the levy are based on the quantity of energy purchased from the market, so that these cost items are passed on to the customer after they are multiplied by the loss factors.

The Role of the Retailer

Although the various organisations are paid individually for their contributions to the overall delivery of electricity to the consumer, it is basically the retailer who collects the revenue from the consumer on their behalf. The Retailer must balance these revenues in order to pay the other parties in accordance with the regulations. These payments are made up of a combination of fixed and variable charges, some of which vary according to the geographical location of the customer and the make up of the distribution system.

The Retailer has the ability to negotiate energy price with large contestable consumers and the consumers are not bound to accept delivery from the area resident retailer. This results in competition between retailers across geographic boundaries utilising the commonly available distribution networks.

However, not all of the components of price are negotiable and the current regulations prevent many of the fixed costs relating to the geographic differences being spread across all of a retailer's customer base. The cross subsidy does offset this to some extent.

Gippsland has a predominance of long sub-transmission lines in a large rural area This virtually ensures that some customers in Gippsland and therefore the Latrobe Valley, will pay more for their electricity than similar customers in the Melbourne metropolitan area. The pricing formula currently makes no allowance for distance or location on a particular line and all customers share the loss factor equally. Any change to the averaging approach would create severe complications however an alternative may be to re-configure the distribution system in the Latrobe Valley so that consumers are not on the long lines.

Putting It Together

The foregoing considered the effects of transmission and distribution system charges as seen by end use consumers of electricity, and also of the effects of losses in those systems. There is a need to combine the various charges and losses to see how paying customers are effected.

Consider a very large, high voltage customer seeking to locate a business somewhere in Victoria. The customer has a maximum demand of 5 MW and an annual energy consumption of 30,000 MWh (or 30 GWh). The electricity consumption is assumed to be equally split between the peak and offpeak charging periods. This size is representative of an industrial enterprise such as a major dairy factory. It is assumed that the customer has acquired an energy supply from a retailer for an average price of $35 per MWh *at the Pool.*

The following Tables 2, 3 and 4 illustrate the items appearing on a hypothetical annual electricity bill if the business were located at different sites in Victoria - at Ballarat, in the western suburbs of Melbourne, and at Morwell. In each case, the customer's supply is derived from a long subtransmission line. Network charges, loss factors and pool charges are actual rates for these locations. (These bills are simplified somewhat - in practice, the customer would receive bills on a monthly basis. Also, the retail energy charge and the network energy charge would probably be split into peak and offpeak periods.)

These bills show substantial cost differences depending on location. The major source of difference arises from the network charges, these being highest in western Victoria and lowest in the metropolitan area. The different loss factors applying at the three sites are of minor importance by comparison.

Table 2 - Electricity Account - Customer at Ballarat

	Chargeable Amount	Market Price	Price incl Losses	Annual Cost $000
Network Charges				
Standing Charge				2
Demand	5 MW		83.93 $/kw.y	420
Energy	30 GWh		11.49 $/MWh	345
Retailer Charge				
Energy	30 GWh	35.00	38.27 $/MWh	1148
Other Charges				
Market Fees	30 GWh	1.24	1.36 $/MWh	41
Govt. Levy	30 GWh	2.08	2.27 $/MWh	68
Total Annual Cost				**2024**
Equivalent Unit Cost			**67.47** $/MWh	
Distributor - Powercor		*MLF =*	*1.0231*	*DLF = 1.0687*

Table 3 - Electricity Account - Customer at Footscray

	Chargeable Amount	Market Price	Price incl Losses	Annual Cost $000
Network Charges				
Standing Charge				3
Demand	5 MW		45.28 $/kw.y	226
Energy	30 GWh		9.06 $/MWh	272
Retailer Charge				
Energy	30 GWh	35.00	37.27 $/MWh	1118
Other Charges				
Market Fees	30 GWh	1.24	1.32 $/MWh	40
Govt. Levy	30 GWh	2.08	2.21 $/MWh	66
Total Annual Cost				**1725**
Equivalent Unit Cost			**57.50** $/MWh	
Distributor - AGL Electricity		*MLF =*	*1.0210*	*DLF = 1.0430*

Table 4 - Electricity Account - Customer at Morwell

	Chargeable Amount	Market Price	Price incl Losses	Annual Cost $000
Network Charges				
Standing Charge				3
Demand	5 MW		62.71 $/kw.y	314
Energy	30 GWh		9.38 $/MWh	281
Retailer Charge				
Energy	30 GWh	35.00	38.19 $/MWh	1146
Other Charges				
Market Fees	30 GWh	1.24	1.36 $/MWh	41
Govt. Levy	30 GWh	2.08	2.27 $/MWh	68
Total Annual Cost				**1853**
Equivalent Unit Cost			**61.77** $/MWh	
Distributor - Eastern Energy		*MLF =*	*0.9960*	*DLF = 1.0954*

The new system has resulted in anomalies with different geographical areas having different price structures. Although high usage customers can negotiate with different retailers, the geography will dictate elements of price which are not negotiable. This means that large customers in Western Victoria will pay more than large customers in Gippsland, who often pay more than similar customers in metropolitan Melbourne. Clearly this has the potential to influence decisions regarding location.

Pricing Reviews

In accordance with provisions in the code, NECA has initiated a review of the principles used for determining pricing for transmission. The review is also considering those aspects of distribution pricing which may be common to both transmission and distribution. The findings of the review could have significant commercial implications for existing generators and customers. Submissions were sought from interested parties during 1998, and a draft of findings and recommendations is expected to be issued by the end of February 1999. This draft will be available for public comment. The ACCC and Business Australia have already commented that the process of TUOS and DUOS bundling together may not be appropriate and the averaging concept needs reworking.

The Victorian Regulator General is also conducting a review of the principles of distribution pricing in Victoria to apply after the expiry of the current arrangements in December 2000. This review also seeks input from interested parties although there have not been submissions from bodies outside the immediate industry.

The achievement of amendments, particularly in respect to transmission and distribution charges which address specific regional interests, will be difficult. Complexity and potential flow on impact are two of the issues which should be addressed. A process does exist to introduce change where it can be forcefully argued on merit through submissions to the appropriate bodies, at the appropriate time, in the appropriate format. Other interested parties may see benefits in regulatory changes which ultimately improve their commercial position.

Submissions will need to demonstrate a comprehensive understanding of the existing system and offer alternative solutions that will not create complications in other areas. It needs to be understood if this is a zero based exercise gains achieved in one area will result in losses to another area. An argument does exist for a better than zero based scenario. La Trobe needs to present an argument which is convincing on a number of levels and here should be an expectation that other participants in transmission, distribution and generation will join with a well thought out and presented argument.

It should be noted that under the current arrangement, generators pay almost no TUOS charges. During the course of the NECA TUOS review, strong views put by the Commonwealth Government, the Australian Co-generation Association and the retailers, suggested that generators should pay a substantial amount of TUOS. Should the generators be unsuccessful in maintaining the current position they will have a strong incentive to enter into direct supply arrangements to bypass the transmission and distribution systems to avoid TUOS charges.

Co-Location

There is interest among the generators in the Latrobe Valley in exploring the possibilities of new industry locating onto land owned by the generators, close to the power station and being supplied with electricity independent of the National Grid.

It would be possible to achieve significant savings because there would be no regulated network charges. These savings would be offset to some extent by the need for some generators to install lower voltage lines and necessary ancillary equipment to supply directly to a consumer. There may also be a reliability penalty for industry when the generator is not generating, or loses load unexpectedly, unless alternative supply facilities are built.

At present the generators favour large electricity intensive customers; however they may be prepared to consider other options particularly if those new industries were to utilise other generator products such as Briquettes, Steam, Heat and High Quality Water.

A submission to achieve the necessary regulatory changes should be well received particularly when the Latrobe Region can demonstrate that it has major infrastructure already in place, under-utilised resources and ancillary services of significance to new industry.

Conclusions

The changes which have been implemented to date are complex and the application difficult. They have been formulated as an attempt to provide a fair and equitable position for all involved based on the national interest. The regulations have been formulated using international experience and attempting to adapt to the Australian conditions. In spite of this the Regulatory bodies are unlikely to satisfy all parties.

The key points to emerge from a Regional Economic Development perspective are

- The major element of cost variation relates to the Transmission and Distribution Use of System charges (Network Charges).
- The existing system does take account of Transmission Losses and this could favour industry locating close to generators.
- The fact that Gippsland is a large area, sparsely populated, with long distribution lines and serviced by a single distributor, generally acts against the achievement of lower network charges in the LaTrobe region, although there is scope for improvement. This would be enhanced by the construction of new distribution facilities that effectively shortened the lines servicing the Latrobe Valley.
- The high historical cost of transmission infrastructure is averaged over the area serviced by specific terminal stations.
- The individual retailer is obliged to pass on the fixed system charges and needs to spread the retail overheads across the customer base. Individual customers with high use can negotiate lower energy prices, however these are basically subsidised by other customers.
- The Regulator General is obliged to review the Network Charges every five years and such a review is currently under way. It is possible for a submission outlining a Regional perspective.
- Location of industry in the Latrobe Region will delay the construction of new Network assets in other locations and delay investment in new generating plant, due to savings in transmission losses. This would consequently benefit Australia's contribution to Greenhouse gas reduction strategy. This is of substantial national economic benefit and should be a major consideration in any pricing review submission.
- The issue of co-location of industry with a generator could provide a significant opportunity to attract new industry to the region.

Glossary of Terms

ACCC	Australian Competition and Consumer Commission
CPI - *x*	Consumer Price Index minus a Factor to be determined
CRNP	Cost Reflective Network Pricing – a system of calculating price which considers the value of the assets employed
DUOS charges	Distribution use of system - fees payable for use of distribution system for delivery of electricity
EHV	Extra High Voltage
MLF	Marginal Loss Factor
NEC	National Electricity Code
NECA	National Electricity Code Administrator
NEM	National Electricity Market - the uniform competitive market operating in the eastern and southern states of Australia
NEMMCO	National Electricity Market Operating Company
ORG	Office of the Regulator General - the responsible regulator for Victorian aspects of the market
RRN	Regional Reference Node
RRP	Regional Reference Price
TUOS charges	Transmission use of system - fees payable for use of transmission system for delivery of electricity
VPX	Victorian Power Exchange
VENCorp	Victorian Energy Networks Corporation - responsible for the operation of the Victorian high voltage electricity transmission system (and also the high pressure gas pipelines network) since the introduction of the NEM.

Contestable Customer Timetable

CUSTOMER SIZE	AUST CAPITAL TERRITORY	NEW SOUTH WALES	QUEENSLAND	SOUTH AUSTRALIA	VICTORIA
Above 5 MW or 40 GWh per annum	October 1997 5 sites	October 1996 47 sites	January 1998 43 sites	Not applicable	December 1994 47 sites
Above 1 MW or 4 GWh per annum	March 1998 40 sites	April 1997 660 sites	October 1998 346 sites	Market start 150 sites	July 1995 330 sites
Above 750 MW per annum	May 1998 247 sites	July 1997 3,500 sites	Not classified	6 months after market start 635 sites	July 1996 1,500 sites
Above 160 MW	July 1998 781 sites	July 1998 10,800 sites	July 1999 6,317 sites	January 2000 2,400 sites	July 1998 5,000 sites
All customers	July 1999 125,000 sites	January 2001 2,700,000 sites	January 2001 1,407,000 sites	January 2003 700,000 sites	January 2001 1,957,300 sites

NATIONAL ELECTRICITY MARKET - AN UNEVEN PLAYING FIELD

	Capacity MW	Date Fully Commissioned	Value $bn	Gearing
Loy Yang A	2,000	1987	4.9	75%
Hazelwood	1,600	1971	2.4	60%
Yallourn	1,450	1982	2.4	65%
Delta				
Mt Piper	1,320	1994		
Vales Point	1,320	1979	1.1	34%
Wallerawang	1,000	1976		
Munmorah	600	1967		
Delta				
Hogg Study Valuation			2.2	

YALLOURN

Delta - Highlights that NSW assets are under valued and undergeared. NSW taxpayers are paying for this.

1997/98 Accounts	**$M**
Operating Profit	54.6
After deducting	
Interest	44.0
Depreciation	28.0
ROCE	4.7%

Adjusted 1997/98 Accounts On level playing field basis	**$M**
Operating Profit	54.6
less	
Increased interest charged on value of $2.2bn geared @ 65%	99.0
Increased depreciation over 30 years	45.0
Vesting contracts @ $37 not $44 MWh	70.0
Operating loss	159.4

Difference = $214M

Additional price impact on production = $10.7 MWh

YALLOURN

UNEVEN PLAYING FIELD

- Delta signed five year contract with ACTEW @ $26 MWh - could only be signed on uncompetitive basis
- Pacific Power signed 10 year contract at $18 MWh with Powercor (new entrant priced at $38 MWh)
- Contracts signed without force majeure
- 5% retail tax to cover generation losses
- NSW taxpayer funding subsidisation of electricity industry

YALLOURN