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**ELECTRIC POWER INDUSTRY RESTRUCTURING IN AUSTRALIA:  
LESSONS FROM DOWN-UNDER**

by

Dennis Ray  
Co-Director, Wisconsin Public Utility Institute  
Assistant Professor  
School of Business  
University of Wisconsin-Madison

prepared for

**THE NATIONAL REGULATORY RESEARCH INSTITUTE**

The Ohio State University  
1080 Carmack Road  
Columbus, Ohio 43210-1002  
Phone: 614/292-9404  
Fax: 614/292-7196  
Website: [www.nrri.ohio-state.edu](http://www.nrri.ohio-state.edu)

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## EXECUTIVE SUMMARY

Australia's electric power industry is undergoing major restructuring to achieve a competitive market structure in generation and retailing. This restructuring includes (1) commercialization of state-owned electric organization through privatization or through corporatization into separate governmental business units; (2) structural unbundling of generation, transmission, retailing, and distribution; and (3) creation of a National Electricity Market (with the initial phase of operation beginning in February 1997) organized as a centralized, market-based trading pool for buying and selling electricity.

A variety of regulatory regimes will be used in the Australian market. These regimes include antitrust enforcement (particularly in the wholesale market), companies with independent boards to govern and operate the market, and state regulation of distribution and retailing. "Light-handed" regulation of transmission and distribution services occurs through revenue and price cap mechanisms. Specific policies toward sustainable energy options and obligation to serve vary. In those policy areas, Victoria relies heavily on market forces (but with an obligation to connect), but New South Wales places requirements on retailers and distribution businesses through licensing.

The Australian states and territories have been restructuring their electric power industries at different paces using different policy approaches. Victoria has the longest history of significant restructuring with vertical and horizontal disaggregation of its state-owned electric utility starting in 1993, the formation of a centralized trading pool in 1994, privatization of its distribution businesses in 1995, and partial privatization of its generation capability. With industry restructuring, there has been a significant decline in employment dropping from over 20,000 to just over 6,000.

Victoria will phase-in full retail competition by the end of the year 2000, starting with the largest customers. Entry of new retailers has occurred, many of whom have

distribution and retailing businesses in other states. About 40 percent of the "contestable" customers (that is, customers who can choose a supplier) have changed retailers so far. Victoria's Office of the Regulator-General reports that customer benefits have flowed from the restructuring to date through lower prices and improved reliability. A recent survey of some contestable customers suggests that the major benefactors among the contestable customers are those customers who are willing to negotiate for a better deal, receiving about a 10 percent price decrease on average. Some customers reported no price change or even somewhat higher prices. A majority of these customers perceived no change or improved retailer service quality (although a small number reported a decrease in quality). Franchise residential and commercial customers (that is, those who do not have supplier choice until 2000) receive lower real prices through CPI-X price setting.

There have been numerous challenges in forming the National Electricity Market, and in learning how to meet business and social objectives in it, such as:

- Achieving effective competition results during transition,
- Obtaining jurisdictional approval of the new market structure and the Code of Conduct,
- Coping with organizational restructuring,
- Meeting the operational requirements of the new marketplace,
- Installing the metering and information systems needed to support the market,
- Understanding the implications of the new risk levels, and
- Developing new trading and marketing skills.

Some lessons can be drawn from the Australian restructuring experience to date.

- Sufficient transmission capability is fundamental for achieving effective competition.

- Control, operational capabilities, unit size, and aggregate levels of generation affect the functioning of the generation market.
- New emphases will emerge for state regulation.
- A coordinated effort is needed to restructure the market.
- Sustainable energy policies can be created.
- Transition policies for restructuring may differ from long-term policies and they may not need to be uniform across the states.

Certainly there are differences in the drivers for restructuring between the US and Australia, but many restructuring policy issues are similar. Unfortunately for policy-makers facing decisions in the near-term, many questions about the results of restructuring in Australia can only be answered in the longer-term. However, it is intriguing to examine Australia's direction and experiences in restructuring. Such an examination provides insights into questions on the creation of effectively competitive electricity markets and on the appropriate roles for government in a more competitive environment.



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## **FOREWORD**

As part of its Occasional Paper series, the NRRI from time to time commissions reports from outside experts. Occasional Paper No. 20 represents one such report, authored by Professor Dennis Ray. This report looks at the restructuring of the Australian electric power industry. The reader can draw some lessons from that experience for the restructuring of the U.S. electric power industry.

We believe that this report offers policymakers, at both the state and federal level, an objective and timely writing. We thank The Ohio State University for providing the funding for this report. As with all NRRI publications, this report does not necessarily reflect our views or opinions.

Douglas N. Jones  
Director, NRRI  
Columbus, Ohio

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## Introduction

Australia's electric power industry (EPI) is undergoing major restructuring. This restructuring includes commercialization of state-owned electric organization through privatization and through corporatization into separate governmental business units; structural unbundling of generation, transmission, retailing, and distribution; and creation of a National Electricity Market (NEM) organized as a centralized, market-based trading pool for buying and selling electricity. The principal rationales for change in the EPI were the related needs of enhancing international competitiveness, improving productivity, and lowering electric rates. Reducing public debt through privatization also played an important role.

Reforms in the EPI are part of the overall economic reform package that is being implemented in Australia. Enhancing efficiency in the economy through competition is a key objective of the reforms. As the need for reform was being discussed in the early 1990s, Australia's previous prime minister, Paul Keating, observed that "the engine which drives efficiency is free and open competition."<sup>1</sup> The optimism about the economic benefits of the full package of reforms across the different sectors of the economy, including the electricity industry, is reflected in estimated benefits of a 5.5 percent annual increase in real gross domestic product and the creation of 30,000 more jobs.<sup>2</sup> The largest source of the benefits (estimated at 25 percent of total benefits) was projected to come from reform of the electricity and gas sectors.

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<sup>1</sup> Hilmer, F., Raynor, M. and Taperell, G. (1993), *National Competition Policy - Report by the Independent Committee of Inquiry: Executive Overview*, Australia Government Publishing Service, Canberra, August.

<sup>2</sup> Croft, David (1996), "Heading for the National Market in Australia: The New South Wales Experience", International Conference on Competition in the Electricity Industry, Wellington, New Zealand, March. <<http://www.tg.nsw.gov.au/sem/doc/sempapnz/sempapnz.html>>. The assumed exchange rate used throughout the report is US \$0.79 to A \$1.00.

Australia's restructuring policies address issues similar to the ones that are being considered today in the US. Examples of these issues include achieving effective competition and controlling market power; establishing incentives for economically efficient behavior by market participants; applying antitrust enforcement criteria; establishing new roles for state regulation; managing risks during a transition period to a more open marketplace; and maintaining appropriate commitments to public benefits such as environmental protection, sustainable energy options, and low-income household concerns.

The paper provides an overview of structural reforms in Australia and how reform policies have addressed significant policy issues.<sup>3</sup> It focuses on the directions of restructuring in Australia in general, drawing on the experiences in the Victorian market in particular. It begins with an overview of the EPI in Australia, of the drivers for change in that industry, and of the NEM that is being created. The Australia states and territories have been restructuring at different paces and policy approaches.<sup>4</sup> Particular focus for this paper is on Victoria's reforms. It is the Australian state that has the longest history of significant restructuring, beginning with the vertical disaggregation of its state-owned electric utility in 1993 and the formation of a centralized trading pool in 1994. As a result, preliminary information is available about the effects on restructuring on customers and other market participants. The paper also provides a description of the role of Victoria's state regulator, the Office of the Regulator-General, suggesting possible new areas of state regulatory focus in a restructured EPI. Some differences in the approaches taken in Victoria to those in other states are identified. Selected public policy areas of market power, risk, environment, sustainable energy, and service

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<sup>3</sup> Not surprisingly, many of these policies are still evolving as restructuring progresses. The paper draws on printed materials, in-person and phone interviews, and personal observations. In-person interviews were conducted by the author while teaching in the University of Technology-Sydney's Energy Planning and Policy Program from October to December, 1995.

<sup>4</sup> Since only one territory will be included in the National Electricity Market, references to states can be implied to include territories when it is appropriate to do so.

obligations are discussed. Finally, challenges in creating a NEM are given and insights from the Australian reforms for the US are discussed.

## Overview of Australia's Electric Power Industry

The restructuring of Australia's electric power industry (EPI) is done within the context of existing demand trends, supply technologies, and transmission infrastructure.<sup>5</sup> The Gross Domestic Product (GDP) growth is at 3 to 4 percent per year.<sup>6</sup> That economic growth contributes to the forecasted growth in electricity consumption of about 2.6 percent per year.<sup>7</sup> Industry and commercial electricity consumption is 68 percent of total electricity consumption, with largest consuming industries being the aluminum, mining, and iron and steel industries. Residential consumption is about 30 percent of total consumption. Most customers are located in the eastern states and territories of New South Wales, Victoria, Queensland, Tasmania, and the Australian Capital Territory. Figure 1 shows a map of Australia and profiles its EPI in 1994.

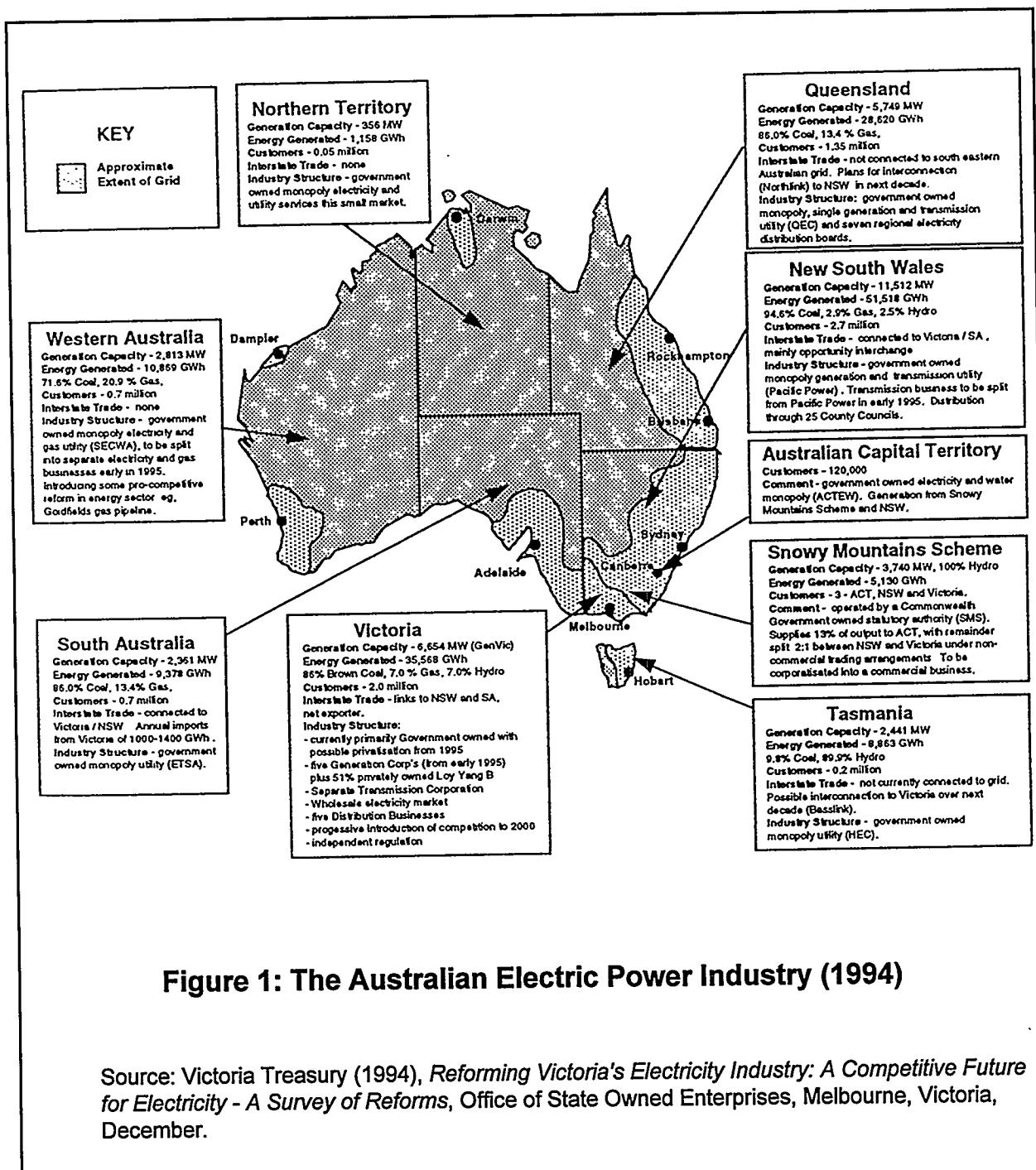
Even though the total land mass is similar, Australia's electricity generation market is much smaller than in the US. Total installed capacity is about 5 percent of that in the US. Coal is the dominant fuel source for electricity generation, fueling approximately 87 percent of generation. Gas is expected to play a greater role in the future. Expansion of gas use for all purposes in eastern Australia is affected by the

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<sup>5</sup> Electric power industry statistics for Australia are given in Electricity Supply Association of Australia Limited (1995), *Electricity Australia 1995*, Melbourne, Australia.

<sup>6</sup> Economist (1996), "Economic Indicators," *The Economist*, August 31.

<sup>7</sup> OECD (1994), *Electricity Supply Industry: Structure, Ownership and Regulation in OECD Countries*, Organization of Economic Cooperation and Development/ International Energy Agency, Paris.



**Figure 1: The Australian Electric Power Industry (1994)**

Source: Victoria Treasury (1994), *Reforming Victoria's Electricity Industry: A Competitive Future for Electricity - A Survey of Reforms*, Office of State Owned Enterprises, Melbourne, Victoria, December.

absence of pipelines from the northwest coast of Western Australia where 80 percent of Australia's reserves exist.<sup>8</sup>

The country has over 7,400 MW of hydroelectric power. Some 2,250 MW are in the small state of Tasmania; however, Tasmania is not currently interconnected with the other states so its hydroelectric capacity will not be included in the initial stages of the NEM's development. Another 3,800 MW of hydroelectric power is located in the Snowy Mountains in eastern Australia. This capacity is owned by the New South Wales, Victoria, and Commonwealth Government. Its 20 percent capacity factor indicates its principal use for peaking and other operational requirements. Due to the size, low operating costs, and high ramp rates of the Snowy Mountains facilities, their use will have a demonstrable influence in the NEM. There is no nuclear power in Australia. In addition, oil-fired generation systems are primarily located in small, remote districts. Table 1 provides the details of generation types by fuel and technologies for each state and territory that will be participating in the NEM. In general, there is a predominance of baseload coal generation capacity and a near-term excess in total capacity.

Australia's transmission system is in need of reinforcement and expansion to support a fully competitive NEM and to enable more efficient use of existing generation capacity.<sup>9</sup> The system was mainly designed to meet intrastate needs. Existing interties pose constraints on interstate trade. Furthermore, only New South Wales, Victoria, South Australia, and Australian Capital Territory are interconnected. The proposed

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<sup>8</sup> Dalziell, Ian; Noble, Ken and Ofei-Mensah, Albert (1993), *The Economics of Interconnection: Electricity Grids and Gas Pipelines in Australia*, Research Report No. 93-12, Australian Bureau of Agricultural and Resource Economics, Canberra, Australia.

<sup>9</sup> Smith, P., Wright, P., and Grainger, W. (1994), "The New South Wales-Queensland Interconnection: Extending the Eastern States Electricity Network", Electrical Engineering Congress, Sydney Australia, November. See also Cook, A. and Rose, I. (1993), "A Monte Carlo Technique for Computing the Benefits Arising from the Interconnection of Power Systems", *IEEE Transactions on Power Systems*, Vol. 8, No. 3, August, pp. 873-878.

**Table 1**

**Generation and Capacity in the National Energy Market States  
as of June 30, 1995\***

<b>Plant Type</b>	<b>Capacity (MW)</b>	<b>Generation (GWh)</b>
Hydro	7,464	15,851
Steam	25,966	130,370
Internal Combustion	58	85
Gas Turbine	1,252	310
<b>Total</b>	<b>34,740</b>	<b>146,616</b>

Source: ESAA Net (1996), *ESI Information*, Issue 96/3, Electricity Supply Association of Australia Limited, Melbourne, Australia, July. <<http://www.ozemail.com.au/~esaamelb>>.

\*Including New South Wales, Victoria, Queensland, South Australia, and Tasmania. There is also 619 MW of capability in these states owned by private producers.

transmission line between Queensland and New South Wales (called Eastlink) could also be viewed as a test to see whether competition will be allowed into the Queensland market.<sup>10</sup> Queensland's Government recently reaffirmed its commitment to interconnect with New South Wales.<sup>11</sup>

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<sup>10</sup> Barclays de Zoete Wedd (1995), *Reforming the Victorian Electricity Supply Industry, Industry Review*, Barclays de Zoete Wedd Australia Limited, January.

<sup>11</sup> Electricity Supply Association of Australia (1996), "What's New," December 16, <<http://www.ozemail.com.au/~esaamelb>>. The Eastlink transmission line had been put on hold by the Queensland government. The competition issue is likely due to the rural customer loads in Queensland. Environmental issues about siting are also present.

Due in part to the abundant supply of low cost coal, Australian electricity prices are low compared to most overseas countries. Nominal electricity prices in Australia were 7.13 US cents/kWh on an average between July 1994 and June 1995, with residential paying 8.47 cents, and industrial and commercial paying 6.45 cents/kWh.<sup>12</sup> Electricity accounts for about 3 to 5 percent of costs for the various industries in Australia.<sup>13</sup> Table 2 gives the prices in the residential, commercial, and industrial classes for the states and territories that will be in the NEM.

**Table 2**  
**Average Electricity Prices By State**  
**from July 1994 to June 1995**  
**(in US cents per kWh)**

Location	Customer Class			Total
	Residential	Commercial	Industrial	
New South Wales	7.6	9.0	4.8	6.5
Victoria	10.1	9.6	5.1	7.6
Queensland	7.7	7.1	-	7.3
South Australia	8.8	8.6	5.5	7.6
Tasmania	7.2	10.1	2.7	4.4
Australia Capitol Territory	6.4	8.9	-	7.7

Source: Electricity Supply Association of Australia Limited (1996), *Electricity Tariffs in Australia*, July 1.

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<sup>12</sup> Electricity Supply Association of Australia Limited (1996), *Electricity Tariffs in Australia*, Melbourne, Australia, July. As mentioned above, the assumed exchange rate is \$.79 US to \$1.00 A.

<sup>13</sup> Rees, Trevor (1996), "Reform of Australia," *Asian Power*, June-July, pp. 19-23.

Australia's EPI experienced falling real prices during the 1980s, dropping by about 2 percent per year.<sup>14</sup> Operating costs were also reduced by 25 percent. In general, productivity growth in EPI exceeded that in the economy during the past two decades.<sup>15</sup>

Australia's EPI was dominated by vertically integrated, state-owned and operated electric utilities. The EPI also included a large number of municipal distribution companies. They were locally-controlled, but purchased their power only from their state-owned utility. The state utilities and municipal undertakings comprise government trading enterprises that derive their corporate identity from acts of state parliaments.<sup>16</sup> Although prevalent in the US, electric cooperatives are just beginning to emerge as the industry restructures.<sup>17</sup>

## Restructuring Australia's Electric Power Industry

The drive to restructure Australia's EPI to a more competition-based market was triggered principally by the need for improving Australia's economic efficiency and international competitiveness, and for reducing state and national debt. Freedom of choice and promotion of trade between states were related objectives of restructuring. The public monopoly structure of Australia's traditional EPI began to be reexamined in the early 1990s. Rising interest rates on state-owned debt, a general economic decline, and productivity and benchmark comparisons that showed opportunities for

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<sup>14</sup> In contrast, the US rates dropped at about 0.4 percent per year during the period.

<sup>15</sup> Bureau of Industrial Economics (1995), *International Benchmarking Overview 1995*, Australian Government Publishing Service, Report 95/20, Canberra, Australia, November.

<sup>16</sup> Hoskinson-Green, B. and Friedlander, C. (1994), "Australia: Special Report", *IFL Review*, Special Supplement, October, pp. 8-14.

<sup>17</sup> Co-operative Energy Ltd, *Choice Realities*, 1995.

cost savings, motivated reexamination of the industry's structure. For instance, in Victoria during the early 1990s, the Victoria Electricity Supply Industry Reform Unit estimated that if the state-owned utility, the State Electricity Commission of Victoria, had operated at world's best practice and made strictly commercial decisions, prices would be around 30 percent lower.<sup>18</sup> Proponents of EPI national reform believed that the threat of competition would increase the pressure to perform to best practice.

Reduction in public debt as a part of restructuring was driven in part by a sharp increase in state debt servicing caused by rising interest rates at the end of the 1980s. Privatization of state-owned businesses has been used to reduce that debt in Victoria with the sale of assets at the generation and distribution levels. The other states have principally commercialized their state-owned electricity industry by creating functionally separate (or "ring-fenced") business units, although some privatization of generating units is also occurring.<sup>19</sup> Implicit privatization of generation will also take place as entry occurs at the generation level.

### Directions of Restructuring

The basic direction of restructuring is to introduce generation and retail competition, and to begin doing so simultaneously. This competitive structure required several elements: (1) a NEM in which all buying and selling of electricity goes through a centralized trading pool; (2) unbundling of generation, transmission, retailing, and

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<sup>18</sup> Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*.

<sup>19</sup> New South Wales' restructuring is described in Croft, D. (1996), "Heading for the National Market in Australia: The New South Wales Experience", International Conference on Competition in the Electricity Industry, Wellington, New Zealand, March. <<http://www.tg.nsw.gov.au/sem/doc/sempapnz/sempapnz.html>>. A summary of restructuring in each state and territory can be found in Electricity Supply Association of Australia (1996), *Structural Change in the Australian Electricity Supply Industry*, Electricity Supply Association of Australia Limited, Melbourne, Australia. <<http://www.ozemail.com.au/~esaamelb/download.htm>>.

distribution functions (and assets) to achieve vertical and horizontal disaggregation of the EPI structure; and (3) the establishment of appropriate regulatory regimes. Each element was considered to be important in fostering an effectively competitive marketplace.

Energy policy has constitutionally been a matter of state action in Australia.<sup>20</sup> In addition, the states had been the owners and operators of the supply structure. In 1991 the state governments agreed to an economic reform package that included a NEM. The Industry Commission, a long-standing federal statutory body whose main objective is to improve the efficiency of the Australian economy, also recommended reforms intended to lead to restructuring of the EPI to subject it to more commercial discipline, and to introduce competition in generation and retailing.<sup>21</sup> In June 1993, the Council of Australian Governments composed of the states, territories, and the Commonwealth agreed to the separation of transmission from generation, and formation of an interstate transmission network. In 1993, the National Competition Policy Review (called the Hilmer Report) also recommended separating the natural monopoly and potentially competitive activities of the utilities.<sup>22</sup> In April 1995, the Council of Australian Governments agreed to a Competition Policies Agreement that implemented the National Competition Policy reforms designed to increase competitiveness and growth prospects for the national economy.

A review and advisory body, the National Competition Council, will assess the progress of state and territory governments in implementing the national competition

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<sup>20</sup> According to R. E. Marks, the publication in April 1988 of the Australian Government document, *Energy 2000: A National Energy Policy Paper*, was the first time the Federal Government had clearly stated its energy policy. Marks, R. E. (1989), "Australian Energy Policy and Conservation", IFAC Symposium on Energy Systems, Management and Economics, Tokyo, Japan.

<sup>21</sup> National Grid Management Council (1994), *Empowering the Market: National Electricity Reform for Australia*, Melbourne, Victoria, December.

<sup>22</sup> Hilmer, F., *National Competition Policy*.

policy reforms including those in the electricity sector.<sup>23</sup> Provided progress by the states continues along the path described in the Competition Policies Agreement, there will be financial assistance grants and special competition payments from the Commonwealth.

### National Electricity Market

A principal feature of Australia's restructuring is the creation of a NEM, focusing principally on the wholesale market for generation and transmission services. A central pool will be used for buying and selling electricity. It is also expected that an extensive financial contracting market will develop to allow market participants to better manage financial risks. Examples of such contracts are one-way and two-way contracts for differences.<sup>24</sup>

The NEM is scheduled to begin in February of 1997 with the states of New South Wales and Victoria. Since both states have already begun a market-based system, the initial step in setting up the national market will be a "harmonizing" of their markets.<sup>25</sup> The two states together have most of Australia's generation capacity and customer loads, so harmonizing their markets will be a major step toward establishing the national market. Eventually, the NEM is to include seven states and territories in

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<sup>23</sup> *Financial Review* (1995), "Government Reforms Lie in NCC Domain", November 7.

<sup>24</sup> Contracts for differences (CFDs) are financial instruments that enable market participants to limit their exposure to pool price volatility. One form of a one-way CFD is an agreement between party A and party B over a specified number of megawatts in which party A pays party B the difference between the actual pool price at a reference or "strike" price (in \$/MWh). In a two-way CFD, party B would also pay party A whenever the actual pool price falls below the strike price.

<sup>25</sup> Structure and operation of the New South Wales market is described in Spalding, B. (1996), "The NSW Wholesale Electricity Market: A Valuable Experience," Annual Conference of the Electricity Supply Engineers' Association, Sydney, Australia, August. <<http://www.tg.nsw.gov.au/sem/doc/reports/410m/index.html>>. The enabling legislation for New South Wales' restructuring was the *Electricity Supply Bill 1995*. The Independent Pricing and Regulatory Tribunal is the state's regulatory agency.

southern and eastern Australia including New South Wales, Victoria, South Australia, Queensland, Tasmania, and the Australian Capital Territory.

Customers will have choice throughout the NEM. Initially, existing retailers and large users will have access to the market. The intention is for retail competition to be phased in to a fully competitive national market by July 1999.<sup>26</sup> There are currently about 6.3 million residential customers, 680 thousand commercial customers, and 184 thousand industrial customers in the states that are designated to participate in the national market.

### Process and Structure

The NEM organizational structure has been chosen to reduce direct government involvement in the governance and management of the market system and power system operations. The process of creating the NEM has been administered by the National Grid Management Council. Its charge was to develop the market to achieve the following objectives:

- Freedom of choice for electricity buyers,
- Non-discriminatory access to the interconnected transmission and distribution network,
- No discriminatory legislative or regulatory barriers to entry for new participants in electricity generation or retailing, and
- No barrier to interstate and/or intrastate trade.<sup>27</sup>

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<sup>26</sup> Zakarus, Paul (1995), "A Rush, or an Australian Crawl to Competition," *Electrical World*, July, pp. 72-77.

<sup>27</sup> National Grid Management Council, *Empowering the Market*, p. 4.

Operations of the NEM will be the responsibility of an independent, government-owned company, the National Electricity Market Management Company, that will be responsible for system operations as well as for market trading (that is, the role of power exchange and independent system operator).<sup>28</sup> It will operate under a National Electricity Code (or Code of Conduct) created and governed by the National Electricity Code Administrator (NECA), a government-owned corporation with an independent Board of Directors.<sup>29</sup> NECA will be responsible for interpretation, modification, and monitoring compliance with the Code.<sup>30</sup> The Code covers the falling areas:

1. *Market rules*: the mechanisms for the spot market, the short-term forward market and settlements;
2. *System security*: the arrangements that ensure the system security is maintained under all system conditions;
3. *Network connection and metering*: the technical arrangements by which customers, generators and retailers can gain access to the network;
4. *Network pricing*: the obligations on network owners with respect to pricing of their networks, and the publishing and billing of charges; and
5. *Administration*: the obligations of participants, dispute resolution process, and mechanisms for making changes to the rules.

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<sup>28</sup> Restructuring proposals in the US often include an independent company for market exchange and independent system operation, but they do not call for government ownership of that organization.

<sup>29</sup> Responsibilities and functions of the National Grid Management Council, National Electricity Market Management Company, and the National Electricity Code Administrator are described in: National Grid Management Council, *Empowering the Market*. The draft National Code of Conduct is found in National Grid Management Council (1996), *NGMC Code Documents for the Proposed National Electricity Market*, Melbourne, Victoria. <[http://electricity.net.au/code\\_m.htm](http://electricity.net.au/code_m.htm)>.

<sup>30</sup> Treasurer (1996), "National Electricity Companies for Melbourne and Adelaide," 2nd Kennett Ministry News Release. <<http://203.14.43.19/pressrel/9a6a.htm>>. Outhred, H. and Kaye, J. (1996), "Incorporating Network Effects in A Competitive Electricity Industry: An Australian Perspective," in Einhorn, M. and Siddiqui, R. (eds.), *Electricity Transmission Pricing and Technology*, Kluwer Academic Publishers, Boston.

Thus, the Code provides the "rules of the road" for the market participants and the National Electricity Market Management Company.

### Design Features

Four key factors in the design of the centralized pool included flexibility in decision-making by market participants, transparency in pool price determination, sufficient central coordination to maintain system reliability, and locational price signals in transmission.<sup>31</sup> The NEM will operate on a centralized generation and demand bidding scheme. Generators will submit bids to the pool and the pool will dispatch them in merit order of bid prices until the demand and supply are efficiently balanced in each trading period. There will be four regions each with spot prices calculated every half-hour based on the average of the six 5-minute ex-ante prices in that half-hour. Bid and offer prices will be scaled by pre-determined loss factors to take into account the location of the participant in a particular intra-regional network. The ex-ante spot market prices provide more flexibility to market participants to respond to changing pool prices.<sup>32</sup> Self-commitment (with notice) will be used by the generators so that they, rather than the National Electricity Market Management Company, will make the decision when their units are available for dispatch.

Given the structure and constraints in the transmission system, locational price signals were deemed important in the transmission pricing scheme. Variations in the prices between the four regions will provide siting messages for the construction of new facilities. Transmission constraints will cause the difference in pool prices across transmission interfaces between regions to be higher than differences simply due to

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<sup>31</sup> Personal communication with Jim Gallaugher, Victoria Power Exchange.

<sup>32</sup> Outhred, H. and Kaye, J. "Incorporating Network Effects."

losses. In general, the transmission network charges were agreed to be "cost reflective" and transmission service revenues will be subject to revenue caps.<sup>33</sup>

### Structural Changes

The second key element of restructuring has been the unbundling of generation, transmission, distribution, and retailing businesses. The traditional distribution functions were divided into distribution network and retailing businesses. Coupled with the unbundling has been horizontal disaggregation of state-owned utilities to create a more competitive environment. This horizontal disaggregation has not included the transmission and system operations businesses that remain centralized with government ownership.

Although each state and territory is moving forward with commercialization of their EPI, the exact form of restructuring has been different across states, particularly regarding privatization. The privatization in Victoria led to the selling of distribution assets, principally to US utilities, and some generation assets to UK and US companies. Some of these sell-offs were in partnership with Australian companies. New South Wales has chosen not to privatize. Instead, it has used corporatization to create competition between business units within that state's government.<sup>34</sup> The government of New South Wales has labor priorities so concerns about the effects of privatization on labor undoubtedly have affected its choice of a restructuring approach.

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<sup>33</sup> Electricity Supply Association of Australia (1996), *Structural Change in the Australian Electricity Supply Industry*.

<sup>34</sup> The nature of the restructuring in New South Wales is given in New South Wales Electricity Reform Task Force (1996), *Retail Competition in Electricity Supply: Treasury Policy Paper TPP 96-1*, New South Wales Department of Treasury, Sydney, Australia, June. <[http://www.nsw.gov.au/treasury/etf/etf96\\_6.html](http://www.nsw.gov.au/treasury/etf/etf96_6.html)>. See also New South Wales Treasury Department (1996), *Electricity Reform at a Glance: Significant Events*, Sydney, Australia <<http://www.nsw.gov.au/treasury/etf.html>>.

Queensland will also be restructuring through horizontal and vertical disaggregation of its industry without privatization.<sup>35</sup> Other states have functionally unbundled and corporatized their EPI organizations, but have not created a competitive market structure through horizontal disaggregation. All of the states continue to own transmission assets, operated and maintained through separate, state-owned business units. This diversity in restructuring approaches was based on each state government's views on what was supportable by their parliament and the populace as a whole, considering technological constraints such as the lack of transmission capacity.

### Regulatory Regimes

There are different but linked regulatory regimes for the wholesale, retailing and distribution markets. In the absence of a national electricity regulatory agency, the Australian Competition and Consumer Commission will be functioning as a "light-handed" national regulator of the wholesale market.<sup>36</sup> One responsibility that it will have as the regulator is the selection of the CPI-X revenue cap formula used in setting transmission revenues.

Since the Code of Conduct for the NEM contains provisions that are inconsistent with national competition legislation (such as the centralized determination of pool prices), the final approval of the Code rests with the Australian Competition and Consumer Commission. As a result, Australia's Trade Practices Act that applies to the economy as a whole, provides the basis for review and approval of the Code rather than standards established by a regulatory authority such as FERC.

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<sup>35</sup>Australian Electricity Industry News, December 18, 1996.

<sup>36</sup>Outhred, H. and Kaye, J. "Incorporating Network Effects." The Australian Competition and Consumer Commission was created in November 1995 through a governmental reorganization based on the recommendation of the Hilmer Report. *Financial Review* (1995), "Double Response to Hilmer Report", November 7.

While responsibility for generation, transmission, and the national wholesale market will come under the umbrella of the Australian Competition and Consumer Commission, responsibility for distribution and retailing will remain with the state governments. However, antitrust issues, such as those regarding mergers, ultimately fall under the purview of the Commission.

## "Radical" Victoria

To provide more detail on the issues and experiences in restructuring in Australia, this section of the paper focuses on a case study of restructuring in Victoria. The first major "radical" reforms of Australia's EPI occurred in Victoria.<sup>37</sup> Victoria's stated reform objectives were:

- Lower costs through efficiency improvements,
- Regenerate the Victorian economy through cheaper power,
- Improve customer choice and services,
- Maintain safe and secure supply,
- Reduce Victorian public sector debt, and
- Provide opportunities for investors to participate in the market development.<sup>38</sup>

Of these objectives, the reduction of public debt has probably received the most attention. In a recent news release from the Office of the Premier of Victoria, it was

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<sup>37</sup> The reforms in Victoria are described in Victoria Treasury (1994), *Reforming Victoria's Electricity Industry: A Competitive Future for Electricity - A Survey of Reforms*, Office of State Owned Enterprises, Department of Treasury, Melbourne, Victoria, December. An overview of the restructuring in Victoria can be found in Barclays de Zoete Wedd Australia Limited (1995), *Reforming the Victorian Electricity Supply Industry*, January.

<sup>38</sup> Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*. In his analysis of the Victorian EPI, Kellow provides a discussion of political factors that played a major role in reforming the EPI. Kellow, Aynsley (1996), *Transforming Power: The Politics of Electricity Planning*, Cambridge University Press: Cambridge (UK).

announced that Victorian households are saving approximately US \$300 per year in interest charges on state debt as a result of electricity privatization.<sup>39</sup> The sale of five distribution businesses, Yallourn Energy, and the Hazelwood power station has raised around US \$10.7 billion for debt reduction.<sup>40</sup>

Reform in Victoria toward commercialization of its state-owned utility business began as early as 1989 when the State Electricity Commission of Victoria restructured into three functionally separate business units in generation, transmission, and distribution (or customer services). These units interacted with each through transfer pricing mechanisms.<sup>41</sup> Victoria began privatization reforms in the early 1990s with the partial privatization of Loy Yang B (a 1,000 MW coal plant), selling 51 percent to Mission Energy in 1992.<sup>42</sup>

With the election of the Liberal-National party in October 1992, headed by Jeffrey Kennett as Premier, the pace of restructuring heightened as the restructuring of the Victorian economy to achieve growth became a principal governmental objective.<sup>43</sup> Effective January 1994, the Victorian government vertically disaggregated the assets, liabilities, and employees of its state-owned State Electricity Commission of Victoria into three new electricity corporations (separate generation, transmission and distribution businesses), and moved to set-up a trading market based on lessons-learned in the

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<sup>39</sup> It is not clear from the announcement whether this is an actual tax savings or simply the interest savings expressed on a per household basis.

<sup>40</sup> News release from the Office of the Premier of Victoria, August 5, 1996.

<sup>41</sup> Kellow *Transforming Power: The Politics of Electricity Planning*.

<sup>42</sup> One of the recent sales has been of that of the Hazelwood Power Station and mine to PacifiCorp and Destec of US (20 percent share each) and National Power of UK (50 percent share).

<sup>43</sup> Kellow, *Transforming Power: The Politics of Electricity Planning*, p. 157. Also, Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*, p. 10.

England and Wales model.<sup>44</sup> Then, it created five generating companies and five distribution businesses with separate retailing and distribution business units. The distribution businesses were created from the State Electricity Commission of Victoria which had supplied 85 percent of Victoria's consumers and from eleven municipal undertakings that had served the remainder. Figure 2 depicts the electricity market structure in Victoria. Currently, business units of the Victorian government continue to control about half of the total 7,700 MW of generating capacity and entitlements in the state, although it has indicated that it intends to continue privatization of that capacity.<sup>45</sup> The Victorian EPI now comprises of the following entities:<sup>46</sup>

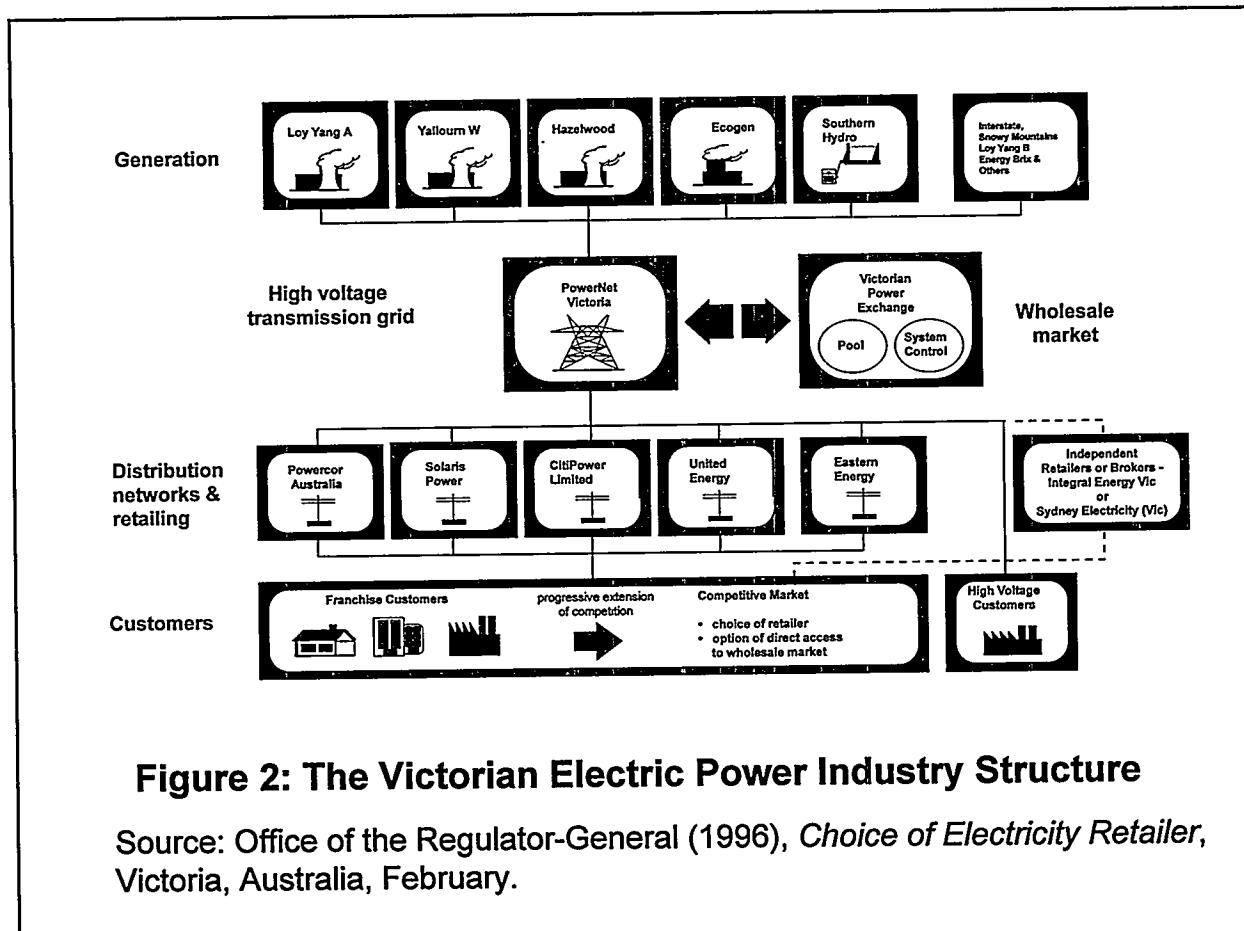
1. *Five generation companies.* There are two fully or partially privatized companies: Yallourn Energy (1,450 MW of capacity) and Hazelwood Power Corporation (1,600 MW). There are also three state-owned corporatized entities: Loy Yang Power Limited (owning Loy Yang A with 2,000 MW of capacity), Ecogen Energy (with about 966 MW), and Southern Hydro (with about 265 MW), each of which sells independently to the wholesale market. Additional generation comes from Loy Yang B, a 1,000 MW plant (partially owned by Mission Energy and bid into the market by the Loy Yang B Trader) that is base loaded at all times under a 33 year long-term contract, and from

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<sup>44</sup> Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*. See also Victoria Treasury (1994), *Reforming Victoria's Electricity Industry: A Competitive Future for Electricity - A Survey of Reforms*, Office of State Owned Enterprises, Department of Treasury, Melbourne, Victoria, December.

<sup>45</sup> Victorian Treasurer Stockdale announced that "Expressions of Interest" will be issued shortly for the purchase of the 2,000 MW Loy Yang A power station, which is Victoria's largest power station, and reaffirmed that the remaining electricity generating assets will be eventually privatized. Australian Electricity Industry News (1996), "Victoria Moves on Gas," December 18.

<sup>46</sup> Office of the Regulator-General (1995), *Fact Sheets 1, 2, 3, and 5*, Melbourne, Victoria, Australia, October. Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*.



**Figure 2: The Victorian Electric Power Industry Structure**

Source: Office of the Regulator-General (1996), *Choice of Electricity Retailer*, Victoria, Australia, February.

the Snowy Mountains hydro power scheme (with 1,088 MW of entitlements for Victoria which is bid into the pool for dispatch by the Snowy Trader).<sup>47</sup> Also participating in the market are smaller generators like Energy Brix Australia (owning the 170 MW Morwell Power Station), Anglesea, and other cogenerators totaling about 250 MW.

<sup>47</sup> The Snowy Mountains scheme is to be corporatized under the current plan for forming the NEM. There are also two other "traders" in the market: the IOA Trader who trades in the interstate market and the Smelter Trader who trades power from aluminum companies.

2. *PowerNet Victoria (PNV)*. Victoria has corporatized ownership of the transmission assets into PowerNet Victoria. PNV is a government corporation that owns and maintains the high voltage grid (US \$1.1 billion asset base), and leases it to the Victorian Power Exchange.<sup>48</sup>
3. *Victorian Power Exchange (VPX)*. The Victorian Power Exchange (VPX) is responsible for the market exchange system, power system security and operations, reliability functions, ancillary services, and transmission planning.<sup>49</sup> It sets pool prices and dispatches generation. It also settles pool revenue flows among generators and retailers. VPX plays no financial role in settling private contracts. VPX operates under rules and code set by the Office of the Regulator General-Victoria.<sup>50</sup> VPX was established on October 3, 1994 under the Electricity Industry Act of 1994. It operates as an independent company funded by sale of its services in the EPI. It is the intent of the Victorian Government that VPX will be owned by industry as the NEM.<sup>51</sup>
4. *Five private distribution businesses*. The distribution businesses provide distribution services and have retailing businesses that supply energy services. The five distribution businesses are Solaris Power, CitiPower, and United Energy that are in the Melbourne Metropolitan area; and PowerCor

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<sup>48</sup> PowerNet Victoria (1995), *PowerNet Annual Report 1994-95*, Melbourne, Victoria.

<sup>49</sup> A description of VPX is found in Victorian Power Exchange (1995), "Introducing the Victorian Power Exchange," Victorian Power Exchange, VPX 101.1. See also VPX (1996), *Victorian Power Exchange: Introduction*, Victorian Power Exchange, Melbourne, Australia. <<http://people.interconnect.com.au/~palberts/vpxwho.htm>>.

<sup>50</sup> The pool rules for Victoria's market are in Office of the Regulator-General (1996), *Vicpool Rules: Amendment 21*, September, available through <<http://electricity.net.au/vpx.html>>.

<sup>51</sup> Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*, p. 19.

Australia and Eastern Energy that mainly serve rural areas. The distribution and retailing businesses are functionally separated for accounting and regulatory purposes.

5. *Independent retail licensees.* To date, seven new independent retailers have entered into the market since the market was opened.<sup>52</sup> These retailers are ACT Electricity and Water, Boral Energy, EnergyAustralia, Ergon Energy, ETSA Power Corporation, Integral Energy, and Yallourn Energy. Most of these new retailers have distribution businesses in other states. New participants enter into the retail supply market upon obtaining a license from the Office of the Regulator General. To trade in the pool, they must meet various VPX rules such as its prudential requirements.<sup>53</sup>

Victoria is phasing in complete retail competition by the end of the year 2000 beginning with the largest customers. The "contestable" customers can choose to buy their electricity from their host retailer, another licensed retailer, a broker, or through the wholesale energy market directly.<sup>54</sup> To date, approximately 2,000 customers whose annual energy use exceeds 750 MWh per year are deemed to be contestable. Another 5,000 customers (with use between 160 and 750 MWh per year) will become contestable in July 1998. The remaining customers who do not have retailer choice at

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<sup>52</sup> Victorian Power Exchange (1996), *VicPool Participants*, Melbourne, Australia, September 17, VPX 404.1. In New South Wales, one organization (TransGrid) has the market operation, system control, and transmission responsibilities that have been split between VPX and PNV. See TransGrid (1996), *New South Wales State Electricity Market: Functional Description*, Document No. SEM002, Market Development Group, TransGrid, Sydney, Australia, March. <<http://www.tg.nsw.gov.au/sem/>>; and TransGrid (1996b), *TransGrid: Vision, Mission and Charter*, TransGrid, Sydney, Australia, May 3. <<http://www.tg.nsw.gov.au/tg-org.htm>>.

<sup>53</sup> An example of a prudential requirement is that the pool customer must either maintain cash reserves or have a bank guarantee in the amount of twice the pool customer's maximum exposure, or must have an acceptable financial rating assessed by a rating agency and VPX.

<sup>54</sup> Aggregation of loads is not allowed at this point in time, even by the same customer that takes supply at multiple supply points to meet the contestable customer requirements. Office of the Regulator-General (1996), *Choice of Electricity Retailer*, Melbourne, Victoria, Australia, February.

this time are "franchise" customers who are served by the five distribution and retailing businesses until they become contestable.

### Operation of VicPool

Victoria's wholesale electricity market is operated under the "PoolCo" class of market structures. Victoria's pool is called VicPool. Under the current pool rules, each Wednesday, generators submit half-hourly bids of the quantity and price of energy that they are prepared to produce for the following Sunday through Saturday period. Energy buyers (mainly retailers) can submit demand-side bids for the half-hourly periods with the amount by which they would reduce their demand if the price rises beyond a certain level. VPX forecasts demands and prepares an economic generation dispatch schedule based on a least-bid merit order over a 24-hour period. At 4:00 P.M. on each day, VPX announces the bidding schedule with expected prices on a day-ahead basis. If the total supply offers fall short of demand, even after voluntary demand management, involuntary load shedding is required.<sup>55</sup>

Pool prices are calculated on an ex-post basis similar to Power Pool of Alberta (Canada), but unlike the England and Wales market where a "forward" spot price is determined on the day before the actual operations.<sup>56</sup> In the VPX, the generators that are included in the dispatch scheme get paid based on the bid price of the marginal generator in each half hour. This price is also referred to as the system marginal price (SMP), market clearing price or, simply, the pool price. Buyers at wholesale also pay prices based on the SMP (with adjustments to the energy purchased based on computed loss factors). VPX is fully compensated for all of its costs. It also collects

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<sup>55</sup> If involuntary load interruption occurs, the system marginal price is set at a predetermined value of lost load (VoLL), currently US \$3,900/MWh.

<sup>56</sup> Dunn, W. H. and Rossi, M. A. (1996) "Practical Aspects of Restructuring," *Electricity Journal*, October, pp. 44-57.

transmission service charges which it pays to PNV, and collects payments for the Loy Yang B unit under a long-term take-or-pay contract.<sup>57</sup>

This pool operation system is what has been used in VicPool. The system will be evolving to harmonize with New South Wales' system and to integrate into the NEM.

### Light-Handed Regulation by the Office of the Regulator-General

Before restructuring, the Victorian EPI was state-owned and had no "regulator." In forming the competitive, privatized EPI, the Victorian government found a need to create an Office of the Regulator-General (ORG).<sup>58</sup> Currently with an office of less than forty employees, the ORG is charged:

- to promote competitive market conduct,
- to prevent misuse of monopoly or market power,
- to facilitate entry,
- to facilitate efficiency in the regulated markets, and
- to ensure that users and consumers benefit from competition and efficiency.

The ORG exercises powers regarding standards and conditions of service and supply, licensing, market conduct, and various other economic regulatory matters. The ORG is responsible for oversight of the retail energy service tariffs for sales to franchise customers (until they become contestable), and for charges for distribution and

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<sup>57</sup> The current Victorian government decided to accept a long-term take-or-pay contract that had been approved by the previous government. Buyers of energy in VicPool pay an uplift charge for that station's costs.

<sup>58</sup> In addition to electricity, the ORG also has a mandate with respect to water, export grain handling, ports, rail and expects a mandate in respect of the gas industry. The responsibilities and policies of the ORG are described in Office of the Regulator-General (1995), *Electricity Industry Guidelines, Issue No. 1*, August 8; and *Electricity Industry Regulatory Statement, Issue No. 2*, September 1.

transmission services.<sup>59</sup> The ORG has no responsibilities in the environmental or energy efficiency areas; such policies are determined by the government and administered by the Environmental Protection Authority.

Regulated tariffs include the sale of electricity to franchise customers (until December 31, 2000), and charges for connection to and use of the distribution and transmission systems. Under the ORG's light-handed regulation policies, CPI-X formulae are used for revenue caps for transmission services and price caps for distribution services.

As mentioned in the previous section, maximum tariffs for energy sales to franchise customers fall under a CPI-X price cap regime. Upon initiation of the NEM, the Australian Competition and Consumer Commission will assume oversight responsibility for transmission pricing. The ORG exercises no control over pool prices for electricity, allowing the market to set those prices based on the market system that Victoria has put in place. Energy prices for contestable customers are also set by the market.

This light-handed regulation was viewed most favorably by the businesses purchasing Victoria's distribution businesses. It undoubtedly contributed to the premiums paid by US utilities and their partners for the distribution businesses. In making their bids, the US utilities likely saw opportunities for cost-cutting (such as in the number of employees) that would increase profitability under a price cap regime, and for learning about business strategies in a more competitive electricity services market.<sup>60</sup> The amounts paid for the assets were viewed most favorably by the Victorian

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<sup>59</sup> The Tariff Order describing regulated tariffs can be found in the Office of the Regulator-General, *Electricity Industry Regulatory Statement, Issue No. 2*.

<sup>60</sup> The basis for computing the expected profitability of the distribution businesses was a normal cost of service model subject to CPI-X price caps. Memorandum from Mr. Robin C. Davey, Regulator-General, Office of the Regulator-General, Melbourne, Victoria, Australia, September 3, 1996. US interests in purchasing Victorian distribution business are discussed in Schuler, Joseph F. (1996), "Australia: Open Arms, Open Access, and the Outback," *Public Utilities Fortnightly*, June, pp. 32-36.

Government since it was pursuing debt reduction as a principal objective of restructuring. Sales of the distribution assets raised 8.3 billion Australian dollars (or about 6.5 billion US dollars).

A key point in the future will be the post-2000 review of price regulation by the ORG. At that point in time, retail energy price regulation will end because all customers will be contestable. The ORG's regulation of distribution prices will continue, but prices and price-setting formulae will be reviewed at that time; however, the ORG is proscribed from reinstituting rate base regulation. Undoubtedly this is also positive for the distribution businesses because it insures the continuation of light-handed regulation unless the Victorian Government changes its enabling legislation.<sup>61</sup>

The ORG has considerable responsibilities to insure that competition works. One of the ways of fulfilling that responsibility is to provide information to the marketplace, thus helping customers to make better decisions about retailer choices. For instance, the ORG was involved in some thirteen seminars designed to help the 1,500 new contestable customers using more than 750 MWh/year prepare for making retailer choices beginning July 1, 1996.<sup>62</sup> The ORG is also informing customers by giving them performance information on services - creating a "league ladder" along various service dimensions (not unlike the public ratings of airline "on-time" performance in the US).

There are two types of performance or customer service indicators: general and guaranteed service levels.<sup>63</sup> The general indicators include: minutes off supply; customer complaints; disconnections and reconnections; payment installment schemes;

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<sup>61</sup> As mentioned above, the ORG will no longer have oversight responsibility for transmission pricing once the NEM is functioning.

<sup>62</sup> Office of the Regulator-General (1996), *Annual Report: 1995-1996*, Melbourne, Victoria. See also Office of the Regulator-General (1996), *Choice of Electricity Retailer*, Melbourne, Victoria, Australia, February.

<sup>63</sup> Office of the Regulator-General (1996), *Electricity Customer Service Indicators: July - December 1995*, Melbourne, Victoria, Australia, May.

refundable security deposits, and administration of community service obligations (described later). There are no established service standards other than Guaranteed Service Levels (GSL). They were introduced by the State Electricity Commission of Victoria in 1993 and continue to be used as a service guideline. GSLs include: timely appointments; permanent connections made by an agreed date; street lighting repaired by an agreed date; and notice of planned interruptions.

Whether both sets of customer service indicators provide sufficient customer information for informed choice has been questioned. Full knowledge for customer choice would likely require information on pricing options, payment options, efficiency options, power quality, power sources, and reliability.<sup>64</sup> Under the current scheme, much of this information would have to come from service suppliers.

Since there are no service standards, the general approach of the ORG has been to determine whether customer service indicators have changed over time. In general, in its evaluation, the ORG has concluded that performance has not fallen. This approach is not based on a determination of what the appropriate minimum service levels should be. Since the performance evaluation is based on company-provided information, effective audits will be needed for full performance assessment.

The ORG has certain market conduct monitoring responsibilities, particularly of the distribution businesses. For instance, the ORG is responsible for monitoring possible cross-subsidization between regulated and unregulated services, and between franchise and non-franchise customer services. The cross-subsidization concern arises because the distribution businesses also have retailing arms. The distribution businesses are required to maintain accounting separation between the regulated and unregulated businesses, keeping books of account that would allow the ORG to investigate for cross-subsidization. In the US, cross-subsidization has been of concern since regulated prices have been cost-based. The cross-subsidization concern is

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<sup>64</sup> Co-operative Energy Ltd, *Choice Realities*.

different in Victoria where the existence of cross-subsidization will be examined to determine whether it is anticompetitive or not otherwise in the interest of customers. This determination is made based on trade practices legislation that covers antitrust issues and that is applicable throughout the country.<sup>65</sup>

Provisions have been made for customer complaints, but not with the ORG. An Electric Industry Ombudsman is being funded by the distribution businesses and the transmission company. In contrast, in the US, electricity customer complaints are often handled within a state agency that has overall regulatory responsibilities. The licenses issued by the ORG require the distribution businesses and transmission company to participate in the Ombudsman scheme. Voluntary resolution of complaints is principally sought by direct contact with the affected business. The ORG is to monitor the complaints received by the Ombudsman for systemic problems that may need to be addressed in licenses or by other means. The effectiveness of this approach will be worthy of evaluation from a consumer protection point of view since the leverage of the Ombudsman will likely be much different than it would have been had the complaints gone directly to the ORG.

In general, the responsibilities and activities of the ORG and the Ombudsman suggest that there are new important public interest objectives for state regulation in a more open EPI.

### Outcomes in Victoria

While the report card has not yet been fully completed, some information is available on the effects of restructuring in Victoria.

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<sup>65</sup> Reports from the ORG cite no specific cross-subsidization cases to date.

## Retail Prices and Choice

Due to opportunities for retailer choice for contestable customers, and the price cap regime for franchise customers, the restructuring appears to have brought positive short-run economic benefits to customers. Some 40 percent of the 1,500 750 MWh/year and above customers, and 20 percent of the 330 1 MWh/year and above customers have chosen to switch retailers.<sup>66</sup> The amount of switching continues to rise. The reasons for the retailer choices made by contestable customers have not been comprehensively analyzed. Some information is available from a recent survey by the Australia Chamber of Commerce of customers attending seminars on how to negotiate for electricity.<sup>67</sup> The following information about what has been happening in the market for contestable customers was found from the 312 contestable customers responding to the survey.

- Seventy-eight percent believed that their new electricity prices were better.
- The average price reduction for businesses changing retailers was 12 percent (including energy, and transmission and distribution network charges) as compared to 10 percent for firms that retained their previous supplier. Two of the newest retailing entrants offered the highest average price reductions of around 14 percent. The surveyed customers reported a range of price reductions, some exceeding 20 percent.

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<sup>66</sup> The number of customers who switched retailers may have been even higher had one megawatt and higher customers not been given the opportunity to continue use of the "Tariff H safety net." Tariff H is a subsidized rate that had been available to industrial customers before restructuring. To avoid rate shock after restructuring, customers on the tariff could continue using it until the end of 2000. The rate under Tariff H escalates at the CPI. Office of the Regulatory-General, *Electricity Industry Regulatory Statement, Issue No. 2*.

<sup>67</sup> Australian Chamber of Manufactures (1996), *Customer Feedback on Victoria's Competitive Electricity Market: A Report on the ACM Survey of Contestable Electricity Customers*, November. The survey was distributed to 800 participants at "Negotiating a Better Electricity Deal" seminars in August 1996. It was intended to provide feedback on the performance of the new market arrangements from the customer perspective.

- Most of the 10 percent that reported increased prices and the 12 percent that reported no price change either had not changed their retailer or had not negotiated a new contract.<sup>68</sup>
- About 33 percent found that retailer service had improved, 64 percent that it had not changed, and 4 percent that it had fallen.
- Thirty-five percent reported that they had changed their retailer.

When it came to choosing an electricity retailer, the respondents identified the following principal factors in their choice: price (93 percent of respondents), understanding needs (53 percent), service (50 percent), and good relations (40 percent). Fifty-three percent of the customers who did not change their retailer cited good relations as the key factor (possibly because the other terms and conditions such as price were deemed comparable with their next best choice). Only 13 percent of the customers that changed retailer named good relations as a key factor. These results suggest that for contestable customers to capture significant benefits from restructuring, they should be prepared to negotiate with existing and new retailers.

Although these results should be interpreted cautiously since the survey simply provides an early indication of the short-term effects of restructuring on selected customers, the results are consistent with several plausible expectations about retailer strategies. New retailers seem to be offering higher price discounts than existing retailers. Such discounts may well be needed to compete against established and well-known retailers (affiliated with distribution businesses). Existing retailers are also lowering prices, particularly to customers that seem willing to pursue options (as

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<sup>68</sup> The reason why 10 percent of the respondents experienced price increases has not been reported. However, it appears that there are three principal reasons: (1) location in rural areas with high network costs and losses resulting in adverse bill affects due to distribution and transmission rate restructuring; (2) load profiles that resulted in higher bills when there was restructuring of the time-of-day electric energy prices causing increased off-peak prices; and (3) unsatisfactory negotiations for new contracts. The contracts were predominantly one year in length so that there will be near term opportunities for new negotiations. This information was provided through personal communication with Robert Lorenzon at the Australian Chamber of Manufactures.

revealed by their willingness to negotiate new contracts). The results are consistent with a retailer strategy of lowering prices when necessary, but also providing good customer relations and meeting other customer preferences (that is, providing additional "value-added" services that may be very important to keeping or attracting customers).

Even though residential, rural, and small business "franchise" customers are not yet contestable, their prices for energy are dropping in real terms. Real electrical energy rates for residential, rural, and small and medium-size business customer are decreasing under a CPI-X price cap scheme (although residential and rural rates were temporarily frozen through June 30, 1996). For example, the X-factor for residential and rural rates is 2 percent for 1996-1997 and will be 1 percent thereafter through 2000. Small and medium-size business customers have price cap schemes that are more generous in their effects on real prices. For them, the initial annual X factors for 1995, 1996, and 1997 are 10, 5, and 5 percent, respectively.

### *Pool Price Volatility*

Pool price volatility affects the economic risks market participants face when selling or buying from the pool. In fact, contestable customers had an incentive to consider renegotiating their contracts. If they did not do so, the energy prices in the interim or default tariffs would have been affected by pool price volatility, thus subjecting those customers to new market price risks. Such rates were adopted under the reasoning that the default retailer (the retailer of the distribution business) had to purchase spot energy for those customers who were not under any contract.

The real-time pool prices are affected by a wide-range of factors such as generation and transmission availability; demand levels and their instantaneous rate of change; and bidding strategies. Therefore, it is not surprising that the prices are

volatile. VPX has published historical half-hourly pool prices.<sup>69</sup> Those prices were used to construct Figure 3 that illustrates the pool price volatility in the Victorian market for the week of the 1996 peak demand (6,083 MW during July 7-13), and a week in November (the Australian spring season) of low demand (3,396 MW during November 3-9). In 1996 through November, half-hourly prices ranged from zero to 31.4 cents (US \$) per kWh.<sup>70</sup> Weekly average prices have been between 0.8 and 3.7 cents per kWh. This volatility arises, in part, to the existence of 500 MW units which, when they go off line, cause a dramatic change in the need for the costly, high ramp rate units, principally hydroelectric and gas units. Prices are also affected by the large amount of baseload capacity that can result in bids of zero to insure that a unit is dispatched above its minimum output level.

This price volatility shows the challenge and risk of operational and investment decision-making based on estimated pool prices. It also suggests that there are at least some conditions under which electricity may be one of the more continuously volatile commodities traded in an open market. Finally, it shows that there is not just one market price that will be of interest to market participants; it is the entire, constantly-changing price cycle that will determine the economics of their operational and investment decisions.

### *Entry, Employment, and Performance*

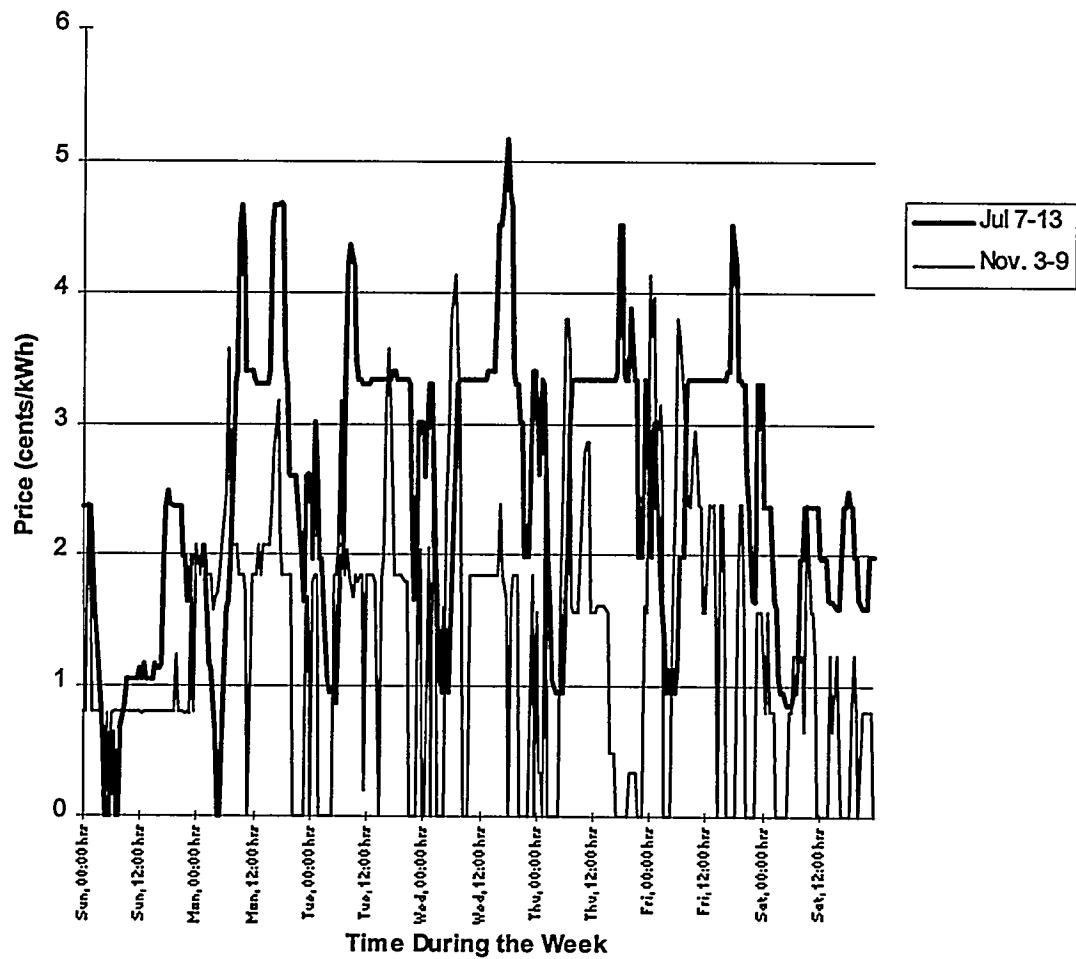
One indicator of the effectiveness of competition is the extent to which entry occurs. As noted above, seven new retailers have entered the retailing market, most of

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<sup>69</sup> Pool price data are available through the web site <<http://www.electricity.net.au>>.

<sup>70</sup> The 31.4 US cents per kWh price occurred at 8:00 A.M. and 6:30 P.M. on August 15.

Figure 3: Half-Hourly Pool Prices in Victoria (US \$)



whom are already retailers in other states. This entry is occurring even though retail supply profit margins may only be in the range of 1 to 3 percent.<sup>71</sup>

Even though entry by new generators is not subject to regulatory constraints, to date, entry appears to be limited to small cogenerators. Other opportunities for entry will arise. Gas turbine technology appears to offer the most attractive alternative for incremental additions to Victoria's generation portfolio in the medium and longer term (to the extent that gas reserves and pipeline capacity will support increased consumption of gas).<sup>72</sup>

Restructuring has had a major effect upon EPI employment. There has been substantial reductions in the number of employees, falling from an industrywide level of over 20,000 in the late 1980s to a little over 6,000 today. How these changes in the work force affect industry performance in the short-run and long-run will be an area for future study.

Apparently, reliability has been maintained if not improved in the short-run in spite of restructuring and employment reductions. Victoria's ORG reports a 4 percent reduction in unplanned outages at the distribution level for the first six months of 1996 as compared to the first six months of 1995.<sup>73</sup> In addition, VPX reports that plant availability has improved for some of the older plants from 60-70 percent up to 80-90 percent thus providing, in effect, an additional 700 MW of expected system capability.<sup>74</sup> Of course, the long-term effects of restructuring on reliability are still unknown.

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<sup>71</sup> Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*.

<sup>72</sup> Ibid.

<sup>73</sup> Personal communication from the ORG.

<sup>74</sup> Personal communication with VPX.

## Selected Restructuring Policy Issues

The Australian experience reveals wide-ranging policy issues associated with creating an effectively competitive EPI. Here are some of the approaches that Australia's policy-makers are taking to address market power, risk, conservation and energy efficiency, and obligation to serve.

### Market Power

Market power issues are a principal concern in restructuring Australia's EPI.<sup>75</sup> These issues arise, in part, because of the relatively small number of competitors and because of constraints on market transactions, particularly those constraints introduced by transmission limits on interstate sales. Given the thinness of the market, the unbundling of generation, transmission, retailing, and distribution functions was important in creating diversity of buyers and sellers in the marketplace. At this point in time the wholesale generation market competition is effectively limited to the eight major generators in New South Wales and Victoria due to the transmission limitations. Thus, the limitations in existing transmission capacity and interconnections between the seven states that eventually are to be in the NEM will influence the effectiveness of a national competitive market.

As mentioned above, the Australian Competition and Consumer Commission oversees the Code of Conduct that details how the individual states and the NEM will work. It has pressed for changes in proposed market mechanisms. For example, in the New South Wales Code, the Commission denied the release of detailed trading

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<sup>75</sup> For a discussion of market power issues in Australia and other countries see Dunn, W. H. and Rossi, M. A., "Practical Aspects of Restructuring." See also Outhred, H. and Kaye, J. (1996), "Australian National Electricity Market: Strength and Weaknesses", International Conference in Industrial Economics, Universidad Carlos III De Madrid, July.

information (such as bid prices) to market participants to make it more difficult for tacit collusion in bidding practices to occur.<sup>76</sup> Market participants object because, from their point of view, without such information the efficient bidding outcome of a competitive market becomes more difficult to attain and because how pool prices are determined each day is less transparent. Market participants also object because they will be less able themselves to "police" the actions of others to assure that gaming or collusion is not occurring.

Market power issues arise because of the size and functionality of generation units. For example, Victorian-owned Loy Yang A has considerable influence over the market due to its 2,000 MW size.<sup>77</sup> Functionality of generation units becomes an issue when there is concentration in the provision of services requiring that function. For example, in Victoria, although there are five generating companies, the government-owned business units are the principal bidders for most ramping and peak power. In addition, the government's Snowy Trader bids for the Snowy Mountains hydro entitlements. As a result, the government-owned businesses play a significant role in setting market prices during rapid changes in system conditions (such as after major generator outages or during periods of rapidly increasing demand) and during peak periods. This shows how difficult it is to apply simple market power tests (such as aggregate market concentration ratios) to the technologically complex EPI.<sup>78</sup>

Mergers in Australia could heighten market power concerns. Rather than simply relying on a review for possible anticompetitive effects by the Australian Competition and Consumer Commission, the Victorian Government chose to place limits on merger

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<sup>76</sup> Personal communication with Brian Spalding, TransGrid, New South Wales.

<sup>77</sup> Dunn, W. H. and Rossi, M. A., "Practical Aspects of Restructuring."

<sup>78</sup> Public information is not available on the percent of time the bid prices of each of the generating entities becomes the system marginal price. As a result, no analysis has been done on the extent to which any one entity is controlling that market price at any given point in time or system operating condition.

activity during the transition period through 2000. For instance, a distribution licensee cannot own more than 200 MW of generating capacity and is limited to 20 percent ownership in a maximum of one other distribution business or generator.<sup>79</sup> One distribution business has merged with a generation company up to that limit. After January 1, 2001, the percent ownership prohibitions will not apply if the ORG is satisfied that a merger will not lessen competition in Victorian markets. Thus, the ORG appears to have a continuing role in merger approvals even after 2000.

### Risk Management During Transition

Australia has taken many actions to reduce market risks in the transition period to a more fully competitive market. Price increase protection has been built into the restructuring through the use of price and revenue cap regulation, and through vesting contracts (based on contracts for differences) between generators and retailers serving franchise customers. Upon initiation of the competition schemes in New South Wales and Victoria, approximately 85 to 90 percent of energy sales were covered by vesting contracts.<sup>80</sup> This was done so that market price volatility would not produce substantial swings in cash flows between generators and distributors/retailers in the pool. This risk protection through vesting contracts falls as retail competition gradually emerges. Of course, generators, retailers, and customers buying directly from the market can use their own risk management tools such as contracts for differences, and short-term forward market contracts, and long-term contracts. The phase-in of retail competition in

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<sup>79</sup> Office of the Regulator-General, *Electricity Industry Regulatory Statement, Issue No. 2*.

<sup>80</sup> The following citations provide information about the vesting contracts and use of contracts for differences. Barclays de Zoete Wedd Australia Limited, *Reforming the Victorian Electricity Supply Industry*. VPX (1994), *VicPool: Victoria's Competitive Electricity Market*, Victorian Power Exchange, September, VPX 501.1. See also Rees, Trevor, "Reform of Australia." In England and Wales approximately 95 percent of the energy was originally covered by contract for differences through the initial vesting contracts.

the states and in the NEM provides a risk mitigation tool that has allowed the necessary support infrastructure to develop to accommodate a fully open market.

Another risk management policy has been to educate market participants about the risks in the market. Through a paper trial conducted by the National Grid Management Council for eight months beginning in November 1993 and through educational programs, efforts are being made to help customers better understand the market and the risks associated with it. The national paper trial had over 190 participants from Queensland through South Australia who were either bidding (as generators) or making financial contracts. The results may not have been realistic given that it was a trial in which participants were operating under different and more simplified rules than will exist in the NEM and that the participants were just learning about this new form of operating and trading; however, the experience "laid the foundations for the designs of the NEM."<sup>81</sup>

The stranded cost risk of great concern to US utilities has not been a significant issue in Australia. This is due, in part, to privatization in which the assets have been sold at market prices exceeding embedded cost and to continuing state ownership of some EPI assets.<sup>82</sup>

### Sustainable Energy Policies and the Environment

Restructuring's effects upon policies toward sustainable energy options (that is, conservation, energy efficiency, and renewables), and the environment varies across

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<sup>81</sup> Personal communication with Brian Spalding. See also National Grid Management Council (1993), *National Electricity Market: Paper Trial Information Kit*, Melbourne, Victoria, October; and National Grid Management Council (1994), *National Electricity Market Paper Trial Evaluation, Volume 1: Evaluation Report*, December.

<sup>82</sup> There is one case of a stranded cost concern in Victoria arising from the partial privatization of the large Loy Yang B generating station before the market was opened. The take-or-pay contract and associated uplift charge were described earlier in the paper.

the states.<sup>83</sup> Arguments are made that the marketplace is the best place for decisions about sustainable energy options to be made. For instance, an article from the Electricity Supply Association of Australia suggests that without specific governmental directives, the distribution businesses with retailing functions will promote demand-side management services for reasons such as deferring construction of distribution facilities; providing cost-effective energy services; mitigating pool price risks through demand-side bidding in the wholesale market; taking advantage of periods when pool prices are low; and social responsibility.<sup>84</sup>

At the same time, there are disincentives for sustainable energy options. Market prices are sufficiently low (due, in part, to excess generation capacity) to limit demand for sustainable energy options. In addition, distribution businesses profit by selling more since most of their costs are fixed. US utilities purchasing Victorian distribution assets have suggested that strong growth in consumption (perhaps as much as a factor of three) should occur in the future.

Victoria and New South Wales provide contrasting approaches to sustainable energy policies. Victoria is using a market approach. The ORG has no specific mandate to require licensees to promote sustainable energy options in the market. On the other hand, the New South Wales government has taken a proactive approach to "safeguarding the environment in a competitive electricity market."<sup>85</sup> It has established

<sup>83</sup> For an historical perspective on policies in Australia toward planning and sustainable energy options, see Kellow, *Transforming Power: The Politics of Electricity Planning*; Marks, R. E. (1989), "Australian Energy Policy and Conservation", IFAC Symposium on Energy Systems, Management and Economics, Tokyo, Japan. In an analysis of the Australian electricity industry, Diesendorf showed that the competitive market contains barriers to the wider implementation of efficient energy use and renewable energy. Diesendorf, M. (1996), "How can a Competitive Market for Electricity be made Compatible with the Reduction of Greenhouse Gas Emissions?", *Ecological Economics*, Vol. 17, pp. 33-48.

<sup>84</sup> Electricity Supply Association of Australia, *Structural Change in the Australian Electricity Supply Industry*.

<sup>85</sup> New South Wales Electricity Reform Taskforce (1996), *Retail Competition in Electricity Supply*, Treasury Policy Paper TPP 96-1, Sydney, Australia, June. <[http://www.nsw.gov.au/treasury/etf/etf96\\_6.html](http://www.nsw.gov.au/treasury/etf/etf96_6.html)>.

the Sustainable Energy Development Authority (SEDA) whose mission it to reduce the level of greenhouse gases in New South Wales by investing in the commercialization and use of sustainable energy technologies. It will focus on opportunities for transforming the market for sustainable energy technologies, particularly energy efficiency, renewable, and cogeneration technologies.<sup>86</sup> SEDA has US \$31 million in discretionary funding over an initial three-year period.

The New South Wales government has also imposed license conditions related to environmental performance.<sup>87</sup> Retail supplier licensees must develop greenhouse gas reduction strategies to meet targets negotiated with the Minister and audited by the Environmental Protection Agency. They must also develop strategies for purchasing energy from sustainable energy sources. Retailers must investigate whether it would be cost-effective to avoid or postpone network augmentation by implementing demand-side management strategies. Retail licensees must develop and publish in annual reports, plans for energy efficiency improvement and demand side management activities.

Governmental policies are not just command-and-control in New South Wales. Its Environmental Protection Agency is exploring the feasibility of using tradable permits on total emissions. Individual retailers are using market-based approaches to sustainable energy options. EnergyAustralia, serving retail customers in New South Wales, recently introduced the Pure Energy Tariff option, a green pricing mechanism. It offers 50,000 domestic customers in Newcastle the choice of purchasing their power from an energy portfolio which includes solar, landfill gas, hydro power and wind turbine

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<sup>86</sup> See overview of SEDA at <<http://www.seda.nsw.gov.au>>. See also New South Wales Electricity Reform Taskforce (1995), *Retail Competition in Electricity Supply: An Issues Paper*, Sydney, Australia, November; and New South Wales Electricity Reform Taskforce (1996), *Retail Competition in Electricity Supply*. <[http://www.nsw.gov.au/treasury/etf/etf96\\_6.html](http://www.nsw.gov.au/treasury/etf/etf96_6.html)>.

<sup>87</sup> Outhred, H. and Kaye, J. "Incorporating Network Effects."

for a small premium on their energy price.<sup>88</sup> EnergyAustralia is also a retailer in the Victorian market.

All states in Australia have environmental requirements and processes that must be followed regarding siting issues and other environmental considerations associated with constructing and operating power stations and transmission lines.<sup>89</sup> The governing statutes apply to new and existing generators alike. Principal environmental responsibilities lie with government agencies other than the "state regulators." The environmental issues are different, too. For example, unlike in the US, Australia leaves sulfur dioxide emissions control up to the states. However, since Australian coal has low sulfur content and many power stations are located where the dominant winds take emissions out to sea, there are few problems in meeting ambient sulfur dioxide standards.<sup>90</sup>

### Obligation to Serve and Community Service Obligations

In the past, each state's electric utilities bore the responsibility for obligation to serve. These obligations are changing under restructuring. In Victoria, the obligation to serve has been limited to an obligation to connect under the licensing requirement that

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<sup>88</sup> EnergyAustralia (1996), "Pure Energy Option: A National First," August 8. <<http://www.energy.com.au/press10.htm>>.

<sup>89</sup> For a general discussion of environmental policies in Australia see Walker, K.J. ed. (1992), *Australian Environmental Policy: Ten Case Studies*, University of New South Wales Press, Kensington (NSW, Australia); and Walker, K.J. (1994), *The Political Economy of Environmental Policy: An Australian Introduction*, University of New South Wales Press, Kensington (NSW, Australia).

<sup>90</sup> Organization of Economic Cooperation and Development (1994), *Electricity Supply Industry: Structure, Ownership and Regulation in OECD Countries*, International Energy Agency, Paris. The state procedures are regarded as sufficient for Commonwealth requirements under the Australian Environment Protection (Impact of Proposals) Act 1974.

distribution businesses provide network access within specified time frames.<sup>91</sup> New South Wales is taking a different approach by requiring the distribution business to continue to be the provider of last resort. In New South Wales, franchise and non-franchise customers have a "statutory right to the supply of electricity" by their electricity distributor under a customer supply contract.<sup>92</sup>

Australian state-owned utilities had a history of meeting community service obligations (CSOs), such as energy relief (assistance) grants, winter energy price concessions, and price concessions to customers on life support systems. In Victoria, the distribution businesses must continue to provide CSOs (since they are the sole providers of distribution and retailing services to franchise customers until full customer choice occurs) under contract with and funding by the Government.<sup>93</sup> For example, energy relief grants are one-time assistance grants for customers who are having a problem with bill payment. A distribution business insures that the customer is aware of the program before disconnection for non-payment so that the customer can apply for a grant from the Government's Department of Human Services.

## Restructuring Challenges

Observers of and participants in the transition of Australia's EPI note a variety of significant challenges in developing and implementing a more open electricity market.<sup>94</sup>

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<sup>91</sup> Comparing the July to December period of 1995 to 1994, the ORG found that disconnections for non-payment decreased by 10 percent for residential and 15 percent for businesses; however, results varied among the distribution business, with some increasing and others decreasing their disconnections over the period. Office of the Regulator-General, *Electricity Customer Service Indicators: July - December 1995*, pp. 7.1-7.2.

<sup>92</sup> New South Wales Electricity Reform Taskforce (1996), *Retail Competition in Electricity Supply Industry: Interim Report*, Sydney, Australia, February. <[http://www.nsw.gov.au/treasury/etf/etf96\\_2.html](http://www.nsw.gov.au/treasury/etf/etf96_2.html)>.

<sup>93</sup> Office of the Regulator-General, *Electricity Industry Regulatory Statement*.

<sup>94</sup> Reflections on these challenges were asked of Brian Spalding, TransGrid; Jim Gallagher, VPX; Neville Henderson, National Grid Management Council; and Bill Dunn, with Barker, Dunn & Rossi, Inc. The author compiled and consolidated their comments along with his own observations.

These selected challenges faced the members of the EPI and the state governments in designing the restructuring reforms, and in developing strategies to respond to that restructuring. The list is not comprehensive, but provides insights into the challenges of the brave new world after restructuring.

- *Understanding the implications of the new risk levels.* The new market poses significant new risks for market participants. Generators face investment risks, and operational risks that an outage will produce a loss of revenues and yet incur continuing costs due to financial contracts (such as contracts for differences) as well as normal business costs. At the same time, as retailers, generators, and customers buy their energy through the wholesale market, they face substantial price risks unless they are protected through a properly executed financial contract. Not only do the market players have to be able to understand these risks, but they also need to know how to protect themselves against undesired risk levels.
- *Developing new trading and marketing skills.* The new economic world created by increased competitive interplay means that all participants in the market must develop new trading and marketing skills. The need for new trading skills arises from the new market mechanisms for buying and selling electricity. New marketing skills must be used as customer choice options are made increasingly available across all customer classes. As for customers, they need a better understanding of their load profiles, energy needs and options, and risk management techniques to be cost effective in purchasing energy at acceptable risk levels. Increased skills in proper use of financial risk management will be needed by all market participants.
- *Installing the metering and the information system needed to support the market.* The metering installation issue arises from giving customers choice. Real-time (smart) metering will be required of large users taking advantage of retailer choice options. General load profiles will be used for other

customers. Servicing (such as making necessary financial settlements) retailers, retail customers, generating companies, transmission owners, and pool operations requires development of a large-scale, robust information system that obviously has not yet been implemented under a full customer choice regime.

- *Meeting operational requirements of the new marketplace.* The NEM will integrate control areas spanning some two thousand miles to produce an operational system that will be dispatching units, maintaining system integrity, and setting locational prices every five minutes. New South Wales, Victoria, and South Australia have state control centers that have operated cooperatively in their interconnected system for a number of years and will be prepared to operate their state systems in emergencies once the NEM is operational. The NEM poses a very new operating environment based on a centralized trading and price-setting model. Meeting this challenge requires considerable effort in getting agreements on procedures, and developing new information and control systems to implement them.
- *Obtaining jurisdictional approval of the new market structure and the Code of Conduct.* The entire process of creating the NEM was by consensus of the different states. Furthermore, as mentioned above the Code of Conduct requires review and approval by the Australian Competition and Consumer Commission that uses the Trade Practices Act framework to review the Code. Obtaining the necessary agreements and approvals has taken time. The Commission is now undertaking the process of making the final review of the National Code.
- *Coping with organizational restructuring.* The organizational changes have been tremendous. Separate distribution business units have been consolidated. There has been disaggregation of vertically-integrated, government-owned organizations into unbundled generation, transmission,

retailing, and distribution businesses. In some cases, privatization has followed consolidation and disaggregation. The result has been the creation of a completely new industry organization characterized by reduced employment and market-induced tensions within a group of people that had been working together in the former more cooperative environment. The workforce is having to learn how to work in a new environment that requires different tools and performance expectations.

- *Achieving effective competition results during transition.* Even if it is presumed that effective competition will be attained in the long-term, in the short-term, the existing technological infrastructure and ownership patterns will limit the effectiveness of competition. Opportunistic behavior by the players in a not yet fully-understood operational environment will produce situations where there is potential for market prices to be manipulated (perhaps through strategic withdrawal of plant availability or through bidding practices). It remains to be tested how effectively the National Electricity Market Management Company, the National Electric Code Administrator, and, ultimately, the Australian Competition and Consumer Commission will be able to insure that such behavior is constrained. Flexibility in adjusting policies and practices to the new market behaviors may be key to successful implementation in the long-run.

## Conclusion

It is intriguing to examine Australia's direction and experience in restructuring. Such an examination provides insights into many questions regarding the creation of effectively competitive electricity markets and the appropriate roles for government in a more competitive environment. Certainly there are differences in the drivers for

restructuring between the US and Australia, but many restructuring policy issues are similar.

Many questions about Australia's restructuring policies remain unanswered. Will effective competition be attained? What will happen to long-term reliability at the distribution and system levels? What benefits of competition will flow to each customer segment, particularly as price protections are removed when all customers are declared contestable? Will environmental objectives be attained? Can different state policies and approaches to restructuring and addressing social concerns be sustained in a competitive market? In addition, it will be most interesting to observe the nature and effectiveness of the competitive behavior by the corporatized, state-owned business units. Unfortunately for policy-makers making decisions in the near-term, the answers to these questions will have to be found over time.

There are several general lessons-learned from the Australian restructuring experience to date that reinforce the importance of many restructuring issues being faced in the US.

- **SUFFICIENT TRANSMISSION CAPABILITY IS FUNDAMENTAL FOR ACHIEVING EFFECTIVE COMPETITION.** Transmission infrastructure inadequacies are limiting the scope of competitive opportunity in the Australia. These inadequacies are exacerbated by the largely radial (rather than mesh) nature of the transmission system among the principal states. Although the US has a transmission system that is more developed and generally has more of a meshed network structure, constraints do exist that will affect competitive potential. Even though increased transmission capability may facilitate greater trading in the wholesale market, the decision to invest in additional capability simply to increasing trading potential raises new questions about the appropriate engineering and economic standards for that investment.

- **CONTROL, OPERATIONAL CAPABILITIES, UNIT SIZE, AND AGGREGATE LEVELS OF GENERATION AFFECT THE FUNCTIONING OF AN OPEN GENERATION MARKET.** The characteristics and control of generation technologies will affect price levels and volatility in an open generation market. Market power is also complex to evaluate due to opportunities for concentration at the aggregate level, but also for specific services (such as ramping or peak power) during certain system conditions. Business units of Victoria's government currently own, have entitlements, and operate a high percent of total generation capability and of generation units that meet specific operational needs in the system, and the largest single plant in the system (the 2,000 MW Loy Yang A). The prevalence of 500 MW units in the relatively small Victorian system adds to pool price volatility. The effects of such control, ownership and technological patterns remain to be studied. However, in time, new transmission interconnection capacity, new entry, and further horizontal disaggregation of generation assets could counter the influence that concentration has on the market.
- **NEW EMPHASES WILL EMERGE FOR STATE REGULATION.** The functions of the state regulation in New South Wales and Victoria suggest areas of new focus for state regulation in a restructured EPI. These areas include consumer protection (such as complaint systems, market participation information, service standards monitoring, performance reporting, and monitoring of compliance with established policies), regulation of distribution functions apart from generation and transmission services, cross-subsidization protections between regulated and unregulated activities, and licensing of entrants. Differences between license requirements in New South Wales and Victoria (such as in the obligation to serve versus connect) point out that important policy decisions will have to be made regarding the nature of the licenses for retailers, distributor, and generators.

- **A COORDINATED EFFORT IS NEEDED TO RESTRUCTURE THE MARKET.** In Australia, the National Grid Management Council worked with supply industry working groups to organize the restructuring details for the NEM after the state, territory and Commonwealth governments approved the direction for industry restructuring. The challenge in the US will be to achieve an open change process that encompasses multiple jurisdictions and control areas, that remains flexible to respond to changing information about the market, and that probably will not begin with the same degree of agreement on the direction for change.
- **SUSTAINABLE ENERGY POLICIES CAN BE CREATED.** As evidenced by restructuring policies in New South Wales, sustainable energy policies remain a matter of public choice. Two dimensions of those policies include customer programs that promote sustainable energy options (through retailer licensing requirements), and that support research, development, and demonstrations (such as the Sustainable Energy Funding Authority in New South Wales). Creative market-based approaches may also make a contribution to achieving environmental objectives.
- **TRANSITION POLICIES FOR RESTRUCTURING MAY DIFFER FROM LONG-TERM POLICIES AND THEY MAY NOT NEED TO BE UNIFORM ACROSS THE STATES.** Australia has used transition policies to reduce (but not eliminate) risks for customers and suppliers. Examples are price risk protections through vesting contracts and explicit merger restrictions over the initial years of operations under a new market regime. Since transition policies are important, it will not be surprising to see an evolution of restructuring policies rather than a "flash-cut" to a new restructured industry. The differences between state policies (such as toward obligation to serve and sustainable energy) suggest that at least until more is

learned about the functioning of the market, uniformity in state policies may not be a necessary condition for restructuring.

A clear difference between the US and Australian electric power industries is the difference in system sizes. Australia is evolving toward one centralized market and interstate system operations center controlled by one management company. To create a new market-based system in the US as a whole will require some form of an integrated control hierarchy for such functions as coordination, system control, trading, and settlements over many regions.

One thing is quite certain, from an historical perspective, the organization and market of Australia's EPI has changed substantially over a very short time period. Significant challenges had to be addressed to get this far, and new challenges will emerge as the scope of the restructuring expands from the individual states toward a national market with full retail competition. It will be interesting to observe how the Australian governments and the EPI respond to the challenges raised as the answers to long-term questions noted above begin to be known.

## Notes