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SMART METERS FOR SMART COMPETITION

HANDING BACK POWER TO CONSUMERS

COMMENT ON CURRENT POLICY AFFECTING INTERVAL METERING AND LOAD PROFILING FOR FULL RETAIL COMPETITION IN ELECTRICITY

REPORT FOR THE CUSTOMER ENERGY COALITION

The Customer Energy Coalition includes end-user and consumer advocacy organisations representing a broad range of interests. CEC members supporting this project are:

- Australian Ecogeneration Association
- Australian Industry Group
- Energy Action Group
- Energy Users' Association of Australia
- Environment Victoria
- Property Management Council of Australia
- Victorian Council of Social Service
- Victorian Farmers Federation
- Victorian Employers' Chamber of Commerce and Industry

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Disclaimer

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The views expressed in this document are based on the professional and independent analysis of information obtained by Pareto and its associates.

Pareto recognises that many consumer representatives have concerns about the policy consultation processes because they lack the expertise and adequate resources to fully understand complex technical issues. An attempt has been made to prepare this report without using terminology peculiar to electricity industry policy debate. For example, meter types are not referred to using the definitions of the National Electricity Code. This is intended to assist consumers and their representatives understand the issues and the impact of policy options.

EXECUTIVE SUMMARY

From January 2002, around 7 million small electricity consumers[1] in the ACT, NSW, Queensland, South Australia and Victoria will enter a competitive retail market due to decisions taken by their respective State governments. So-called Full Retail Competition (FRC) will commence in the ACT, NSW and Victoria on 1 January 2002. South Australia will follow in January 2003 and Queensland at a date to be announced.

Competition is meant to deliver benefits to consumers by allowing them to choose a supplier that best meets their individual needs. Through choice, consumers encourage suppliers to develop products and services that meet needs defined by the consumers. This gives consumers economic power that not only determines the quality of products and services on offer but also the price. In truly competitive markets, this process can deliver substantial and sustainable social benefits.

Electricity is unlike any other product or service that consumers use. Access to, and use of, electricity is essential for participation in our society; and electricity has peculiar characteristics that intimately link the choices consumers make with its production.

- Electricity must be generated and delivered at the same time that it is used because it cannot be easily stored.
- The quantity required at any one time can vary dramatically over relatively short periods and throughout the year.
- The cost of producing electricity is not constant. Some producers may be able to operate all the time and recover their costs at low average prices, and others may be required to operate rarely - say during short periods of high (or low) ambient temperature - and **are assumed** to recover their costs through high average prices.
- These attributes (and the arbitrarily[2] defined market rules in the National Electricity Code (Code)) dominate the way the wholesale price is set in the National Electricity Market (NEM). The wholesale market price is set every half hour and is permitted (by the Code rules) to vary from minus $1.00/kWh to $5.00/kWh[3]; an extreme range compared to the average "retail price" to consumers of less than $0.03 for Off-Peak electricity and around $0.06/kWh for Peak electricity.

[1] "Small" consumers are defined by law or regulation in each jurisdiction of the National Electricity market as those consumers using less than 40MWh/y of electricity. Average household consumption of electricity is around 6MWh/y. Small consumers include households, farms and many small businesses.

[2] The rules of electricity markets are artificial constructs with no direct equivalent in "conventional" markets for, say, fruit and vegetables, computer memory or shares. Different electricity markets around the world have different rules. The UK Pool had different rules to the California PX and ISO markets and both used different rules to the NEM - but all had a common feature of being (in effect) single-price auction, gross energy markets. On that basis the market rules are arbitrary. Market rules in the NEM could be changed so that price is set by different mechanisms than used currently and this might influence a debate on the relative merits of interval metering or load profiling.

[3] From April 2002, the maximum wholesale market price will be permitted to rise to $10.00/kWh - around 2-300 times the average price that consumers have come to expect.

There are other characteristics of electricity supply that create considerable challenges for consumers and for a competitive retail market in electricity. For nearly 80 years,[4] consumers in Australia have expected electricity to be available always and at a (relatively) uniform price **and the supply infrastructure used to deliver electricity to small consumers is "hard-wired" as though this paradigm would always be true**. However, the move away from a State-controlled, regulated supply regime to a (partially) privatised, competitive market regime has fundamentally changed the environment in which that paradigm was established. In this new environment, the absence of realistic economic signals that link cost to price is:

- creating the need for more private investment in rarely used extreme peak generation plant in the southeast Regions of the NEM;
- driving up the average cost of electricity without any sensible feedback to consumers that links cause and effect; and
- handing enormous market power to producers in times of supply constraint.

Not only do small consumers currently receive no effective price signals, but the "hard-wired" supply infrastructure provides no convenient way for them to respond. The absence of, and the inability to respond to, price signals disempowers consumers and can leave them at the mercy of unscrupulous suppliers in a competitive market. It also creates potentially enormous risks for retailers - risks that **must** be passed onto consumers one way or another if retailers are to survive.

On the other hand, giving consumers access to technology and infrastructure that delivers price signals **and allows them to respond easily and conveniently to those signals** would give consumers **real choice**[5] in a competitive electricity market. Limiting competition to **choice of retailer without change to supply infrastructure** - and this is all that consumers are being offered by jurisdictional governments and regulators with the so-called *Net System Load Profile* - is not sufficient to give consumers access to the full benefits of a competitive electricity market.

Providing infrastructure with a convenient and automatic way to manage load in an economically efficient way could also assist in developing market-based mechanisms for reducing greenhouse gas (GHG) emissions. This aspect of policy linking market outcomes to environmental outcomes has been subsumed in Australia and overseas by consideration of the administrative arrangements necessary to settle the wholesale electricity market and allow small consumers to change retailer. Our investigations, which focussed on actual case studies of low-cost interval meter roll-outs did not bring to light any material that linked use of profiles or interval meters with changes in GHG emissions. However, we found no evidence that use of load profiles (even the most sophisticated form of real-time dynamic load profiles used in California) provides any clear incentive for consumers to adopt or modify consumption behaviour. On that basis we express a preliminary view that it is unlikely that load profiling could be used to change incentives that would affect GHG emissions. It might

[4] The State Electricity Commission of Victoria commenced supply from Yallourn Power Station in 1924.

[5] In almost every other area of competition, consumers are able to respond to varying prices of the products and services they buy; such as for fresh fruit and vegetables, household goods and petrol to name just a few. Consumer reaction to price creates the economic pressure that "forces" competing suppliers to respond to consumer demands.

be possible to achieve that outcome with load profiles linked to high cost seasonal or time of use pricing, but this appears difficult to implement through a competitive retail market - and would produce inequitable outcomes for those consumers who acted already act in an environmentally responsible way.

A primary message to Australians concerned about the environmental effects of electricity use is that without interval meters sending economic signals to individual consumers, there will continue to be little incentive for small consumers to change behaviour in a competitive retail market. We go further in this report and argue that without (low-cost) two-way monitoring and remote reading/control technology there will be no easy way for retailers to offer convenient and automatic load management services to consumers. If such services were on offer, they could be tailored to reduce bills by reducing consumption - and thus have a greater impact on GHG emissions. Indeed it might even be possible for retailers to create niche markets in this area. We doubt this would occur with load profiles.

A key "first step" in handing power back to consumers is to install **low-cost** *Interval Meters* (or "smart meters") that record energy consumption in half-hour intervals. The work undertaken by Intelligent Energy Systems Pty Ltd (IES) for the Victorian electricity distribution businesses in 1999 concluded that this step alone has the potential to deliver clear benefit to consumers - **even with what our report shows are conservative assumptions of cost and benefit**.

The overseas examples of universal roll-out of low-cost interval meters presented in our report shows that it is both practical and realistic to provide this infrastructure in the NEM - and to provide **low-cost** remote reading and feedback capability that could deliver the full benefits of competition to consumers. This means that ***current policy for full retail competition is based on incorrect advice about the feasibility of large-scale, low-cost interval meter roll-outs.*** This policy is encapsulated in a letter from the Federal Minister for Industry, Science & Resources to the Victorian Minister for Energy & Resources. This letter, dated 1 March 2001, includes the statement:

> *"In the Commonwealth's view, interval metering provides the most effective solution in the medium term. It has the potential to enhance price competition and to provide retailers and customers with time-of-use price signals. Interval metering will also encourage the development of more effective demand side management technologies.* ***However, I am advised that there is not yet a proven, cost effective interval metering solution for individual households****, nor would it be possible to achieve a mass roll-out of interval meters without substantially delaying the introduction of full retail contestability.*
>
> *Given these limitations, I acknowledge that there is a need to adopt a net system load profiling arrangement in the short term that permits the timely introduction of full retail contestability with existing accumulation meters. It is important however that that this approach also preserves* ***market-based incentives*** *for the subsequent introduction of interval meters."* (Emphasis added).

The findings presented in our report demonstrate conclusively that the Minister has been incorrectly advised in regard to the possibility of mass roll-out of a "proven, cost effective interval metering solution for individual households." The findings in our report also demonstrate that *"market-based incentives"* **have not delivered large-scale interval meter roll-outs anywhere in the world, despite the undoubted benefits that such technology could allow consumers to access.**

Key findings

The key findings presented in this report are:

- Three cases have been identified where low-cost interval meters have been rolled-out, or where roll-out will commence within the next twelve months. **Each of these roll-outs includes *low-cost, remote reading and feedback/control to the meters*.** The Power Line Carrier technologies[6] used in these roll-outs for remote reading and/or feedback/control of interval meters can allow consumers to obtain full benefits from the choices they make about consumption of electricity, either with or without retail competition.
- The cases where wide-scale, low-cost interval meter roll-outs are underway or about to commence are in Italy, Wisconsin and Puerto Rico.[7] Neither Wisconsin nor Puerto Rico has a current commitment to introduce retail competition for electricity. Italy commenced retail competition for electricity in 1999.
- These roll-outs have all occurred (or will occur) in an environment where a single monopoly distribution company has invested in the meters and remote reading technology that will be installed for all consumers. In the Italian case, the meter roll-out is occurring within an incentive price control regime similar to that of the UK (and by extension, all NEM jurisdictions). In Wisconsin, the roll-out has been explicitly approved by the Public Service Commission of Wisconsin (PSCoW) under a "cost-of-service" regulatory regime. The PSCoW explicitly acknowledged that consumers would benefit from the roll-out it has approved.
- A possible fourth example could occur next in California if Governor Gray Davis accepts recommendations being put to him by various stakeholders at the moment.[8] A wide-scale roll-out in interval meters in California would be one of a set of desperate measures intended to put downward pressure on wholesale market prices by stimulating demand response from consumers.
- We can find no examples of large-scale roll-out of manually read interval meters. While this is clearly feasible - and a better approach than use of load profiling - there

[6] We do not endorse (or otherwise) the specific PLC technologies used in these cases that have been developed by either DCSI-TWACS or Echelon in the US. Other PLC technologies are available as are other low cost methods for remote reading and control/feedback that can assist automatic management of consumer load. We have been advised that implementation of such technology is feasible in the NEM, but that technical assessment and testing of distribution systems would be required before a detailed specification of any systems could be completed.

[7] While we have confirmed that a mass roll-out of remotely-read interval meters is underway in Puerto Rico, we have had insufficient resources or time to establish details of this roll-out.

[8] Information obtained during a recent visit by the author to California suggests that large-scale roll-outs of interval meters are also being considered in other US jurisdictions.

are valid questions about the wisdom of implementing such a policy when low-cost remote reading of interval meters is proven. A roll-out of interval meters without remote reading/feedback capability restricts the benefits that consumers could derive from retail competition in electricity.

- **We can find no examples of low-cost roll-out of interval meters in any of the many jurisdictions that rely on competition and customer choice to initiate installation of interval meters**.
- The unit costs of the Wisconsin roll-out and cost for the Italian roll-out[9] are about the same as, or lower than, the costs suggested in the 1999 IES report **for manually read interval meters**. The initial investment cost for the Italian roll-out is just AU$110/metering point for interval meters with a flexible two-way communications technology that will allow automatic load management and a range of other services to be offered to Italian consumers by competing service providers. The Italian electricity company ENEL SpA expects to recover the investment cost of this roll-out in just four years. This makes a similar roll-out in the NEM look very attractive indeed, provided policies are put in place to ensure the low unit costs could be duplicated.[10]
- The low-cost, two-way, remote reading/feedback functionality of these systems has clear potential to deliver greater benefits to consumers than would manually read interval meters. This has convinced policy makers, regulators and company executives that the investment in low-cost, remotely-read interval meters should proceed.
- The cases presented in this report also confirm that remotely-read, interval meters are essential if consumers are to access the majority of benefits available to them from competition in electricity supply. This is due, primarily, to the ability to link individual consumption to wholesale market price and network system performance; and to facilitate automatic, real-time load management for individual consumers. Various technologies for low-cost remote reading also provide the opportunity for competing service providers to offer consumers access to a range of value-added services, some currently provided through "conventional" telecommunications.
- There is no evidence that load profiling has any benefit for consumers generally other than its relatively lower initial cost. Load profiling does not deliver any other quantifiable benefit to consumers as a group. Indeed, load profiling entrenches economically inefficient and inequitable cross-subsidies in the energy price component of retail tariffs. Load profiling will also entrench the incentives that contribute to the extreme summer peak problems that already exist in the southeast Regions of the NEM; and that are also manifesting themselves in the NSW and Queensland Regions.[11]

[9] The official figure for the investment in remotely read interval meters and PLC communications system by ENEL Distribuzione SpA in Italy is 3600 billion Lira for 30 million customer metering points.

[10] There are a range of industry and jurisdictional policies that may create unintended obstacles to reducing the cost of interval meters to levels achieved in overseas markets. The biggest obstacle may be lack of consistency in electricity industry rules and regulations that govern the size, shape and connection of meters and mean it is not practicable to use a single generic meter right across the NEM.

[11] Prof Hugh Outhred of the University of NSW advises that there are signs that summer peak demand is increasing at a faster rate than average demand in both NSW and Queensland. This could lead to a re-run of the current problems in the southeast Regions.

- Our investigations conclude that California was the only jurisdiction in the US to employ true dynamic load profiling based on "live" representative group samples of interval-metered consumers. This is the most sophisticated application possible for load profiling. But there is no evidence that this has any significant effect on demand behaviour of consumers as a whole. Nor is there any evidence that dynamic load profiling delivered any benefit to consumers during the dramatic increase in electricity prices that commenced in San Diego at the start of the 2000 summer.

Key issue to be re-considered

The key issue that needs to be re-considered by the Federal and jurisdictional governments, and the ACCC, is how to develop and support policies that are likely to achieve outcomes in the NEM similar to those in the three cases outlined above. This will be a challenge given the Federal Minister's stated preference for "*market-based incentives*". We reiterate, **competition in metering service does not deliver the desired outcome - anywhere in the world.**

If the Federal Government and the jurisdictions wish to achieve the stated policy objective of rolling out large numbers of low-cost interval meters, it will be essential to re-visit the reliance on market-based incentives in this area.

It is our recommendation that policy makers should also examine every possible option for promoting the roll-out of low-cost remote reading/feedback functionality to every interval meter. This provides the mechanism for developing automatic (and therefore more convenient), real-time, demand response from individual consumers.

We stress that the challenge of encouraging voluntary acceptance of demand response from individual consumers should not be underestimated. Effective voluntary demand response will require consumer acceptance of a different level of supply surety - and that a change in behaviour and expectation will be in their individual interests. Considerable care will be needed to educate consumers and assist them come to terms with the change in expectations and behaviour that this will require. Utilising **and adequately resourcing** the support of consumer advocacy groups could best achieve this goal.

What should the ACCC and governments do?

On 11 April 2001, the ACCC published its draft determination on FRC dealing with metering and profiling policies. This draft determination is not in the interests of consumers or helpful for the promotion of effective competition in a retail electricity market. The ACCC has, in effect, ignored and discounted preliminary evidence presented by the CEC[12] and others and, in effect, offered endorsement of jurisdictional policies that are clearly based on inaccurate assumptions. Confirmation of the draft determination by the ACCC, and its acceptance by jurisdictional governments, will deprive small consumers of the most effective mechanism of gaining full benefits from retail competition in electricity.

[12] The ACCC was provided with a preliminary draft Executive Summary of this report (which has subsequently been extensively revised) and *ad-hoc* details of the three interval meter roll-outs as this was collected by Pareto.

Code Change proposals affecting interval metering and profiling flowing from this ACCC decision are based on the assumption that choice alone - without any changes in supply infrastructure - and competition in metering services will deliver benefits to consumers. The evidence in this report shows that the roll-out of interval meters is essential for consumers to gain access to the full benefits of competition and that reliance on competition has not delivered roll-out of low-cost, remotely-read interval meters anywhere in the world. Australia would accrue greater benefits from introduction of retail competition in electricity by doing everything possible to promote the roll-out of low-cost, remotely read interval meters - and the ACCC draft determination does nothing to progress achievement of this outcome.

Our recommendations to the ACCC and governments are:

- To ensure that the ACCC is able to properly assess Public Benefit from the proposed changes to the Code, the ACCC should make it a condition of authorisation that jurisdictions conduct a full, complete and professionally competent cost-benefit analysis for FRC.

  This cost-benefit analysis should include a reliable and public estimate of the costs to be incurred **by all parties** and a detailed estimate of benefit to distributors, retailers and consumers **for both load profiling as proposed and low-cost interval meters that this report shows is achievable**.

  The analysis should examine the costs and benefits of both manually read interval meters and low-cost remotely-read interval meters; and it should examine the impact on both costs and benefits of delaying commencement of FRC until:

  - all jurisdictions are ready to commence, preferably with common rules and regulations in each jurisdiction that may assist cost minimisation of retail overheads;[13]
  - there is effective roll-out of sufficient low-cost interval meters to ensure a positive net benefit to all consumers;

- The ACCC should not finalise authorisation of the Code for FRC unless this cost-benefit analysis shows a positive net benefit to consumers.

- The ACCC should not approve Code changes that rely on competition for metering services to achieve roll-out of the low-cost interval meters that will be necessary for consumers to have an opportunity of obtaining the greatest benefit from retail competition in electricity.

  Rather, the ACCC should reject Code changes that depend on competition to deliver the benefits of low-cost metering services and make it a condition of authorisation that all aspects of meter services including ownership, installation, and meter reading continue to be regulated as a monopoly activity until there is clear evidence that competition is capable of delivering at least the same benefits to consumers.

[13] We note that retailers in each jurisdiction are subject to different rules and regulations governing their behaviour. These differences increase costs for retailers seeking to operate across the NEM and act as barriers to entry. On that basis alone the ACCC should be concerned and act in the interests of consumers.

We note that this may require monopoly metering services to be legally separated from the retail activities of distribution businesses to ensure that open access to interval meters, remote reading technology and/or interval meter data and competitive neutrality is **seen to be achieved.**

- The ACCC should make it a condition of authorisation that NECA develop a competent and comprehensive market power monitoring and mitigation program for the NEM; and that NECA develop Code change proposals to implement an effective program to control, or preferably, eliminate market power abuse by generators before FRC commences.

If roll-out of proven low-cost, remotely-read interval metering technology can be achieved in the NEM it is far more likely that consumers will have the opportunity to derive benefit from competition for the supply of one of the most important services that affects almost every aspect of modern life.

Such an outcome would be a positive first step in using economic efficiency of the market to reduce energy bills of consumers by convenient and automatic load management. If that first step can be made, it would then be possible to examine development of market-based policies that might contribute to reduction of greenhouse gas emissions - without compromise to economic efficiency incentives.

We believe the ACCC, as the only national agency dealing generally with competition matters and the only agency with responsibility for enforcement of the Trade Practices Act and the associated State/Territory application legislation, has an opportunity to play a crucial leadership role in this policy debate. Accordingly, we trust the ACCC will seriously consider the evidence in this report and act in the interests of consumers by doing everything in its power to facilitate the roll-out of low-cost, remotely-read interval meters as soon as possible.

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1 INTRODUCTION

This paper provides a customer-focused review and comment on the decision by jurisdictional governments and regulators, and the Federal government, to support commencement of full retail competition (FRC) in electricity for small consumers using load profiles as the basis for settlement and billing, rather than half-hourly interval meters. This is a critical aspect of current policy that will clearly restrict the benefits that small consumers could receive from retail competition in electricity supply.

The economic inefficiencies and cross-subsidy inequities entrenched by load profiling will restrain demand-side response in the wholesale market at a time when plant reserve margins are reaching critical levels, particularly in the southern regions of the National Electricity Market (NEM). This will add further upward pressure on already high wholesale market prices.[14] Upward pressure on prices due to unresponsive demand from small consumers without interval meters will also impact on contestable consumers exposed to wholesale market volatility because they do have interval meters.

The paper has been prepared by Pareto Associates Pty Ltd and is supported by members of the Customer Energy Coalition (CEC).[15] The Terms of Reference set by the CEC are attached as Appendix A.

The CEC provides a forum to develop a coordinated voice for electricity consumers operating independently of Government or any regulatory agency. Some members of the CEC have a National constituency and several have taken a high profile interest in national policy debate.[16] The CEC has its own budget (albeit small) raised from public seminars organised to discuss issues of relevance to consumers and has sponsored several policy related assignments funded by direct donations from sympathetic organisations, companies and foundations. Member organisations provide administrative support to the CEC.

1.1 The process so far

Consumer groups have frequently drawn public attention to the difficulties that long, complex and multiple policy development processes cause for end-users. Attention has also been drawn to the extreme difficulties that end-users face due to lack of access to appropriate resources to enable them to effectively state their case. Not the least of the difficulties faced

[14] Material presented later in this report shows that 12 Monthly Moving Average (12MMAv) wholesale market spot price is now substantially higher than efficient new entrant costs in every NEM Region. 12MMAv prices have risen by over 100% in the Victorian and NSW Regions over the last 12 months and by more than 300% since mid-1998.

[15] Membership of CEC includes Australian Cogeneration Association, Australian Industry Group, Energy Action Group, Energy Users' Association of Australia, Environment Victoria, Property Council of Australia, Victorian Council of Social Service, Victorian Employers' Chamber of Commerce and Industry, and Victorian Farmers Federation.

[16] In particular, the Energy Action Group and the Energy Users' Association of Australia commit substantial resources to representation in NEM activities. John Dick, the Vice-President of the EAG, is the sole consumer representative on the NEM Settlements and Transfer Committee (NEMSAT).

by end-users for the development of policies affecting full retail competition (FRC) is that there are different processes and a different policy focus in each of the NEM jurisdictions. It is simply not possible in the current climate for consumers to effectively fund research, analysis, and comment on policy suggestions to a level that allows their interests to be adequately represented in policy processes.

The CEC believes that FRC policy development has been conducted without adequate input from end-users. In Victoria, only one submission to the "consultative" processes run by Government and the Office of the Regulator-General (ORG) has come from consumer groups; and this was a relatively brief contribution from the NSW Public Interest Advocacy Centre. There is no clear indication on websites of other jurisdictions that any other consumer groups have been able to make any written contributions to the policy debate on these important issues.

In the absence of detailed analysis of these issues by the consumer groups, policy development by Government and regulatory agencies has continued based on assurance from the "powers-that-be" that the interests of consumers were being considered. It is not at all clear that this is so. The role of Government and regulatory policy makers is to balance the interests of various stakeholders. Without considered input from consumer representatives, there is no transparency to the process used by decision makers to determine what consumers' interests are or which of these interests should be given priority.

1.2 Are FRC policy objectives in the interests of Consumers?

The latest policy position paper prepared for the NSW and Victorian Governments by KPMG[17] says that *the high-level objectives for FRC, as proposed by NEMSAT (National Electricity Market Settlement and Transfer Committee), are to:*

- *Be cost effective, technically efficient and provide practical opportunities for market and technological evolution;*
- *Support a competitive retail market;*
- *Be consistent with the objectives for the maintenance and enhancement of customer interests;*
- *Ensure the legitimate public policy interests of the jurisdictions are taken into account;*
- *Ensure optimal processes and systems are in place to meet the jurisdictional timetables; and*
- *Where desirable, promote national consistency of jurisdictional systems.*[18]

[17] *Joint Issues Paper, Metrology Procedure for Metering Installations Types 5, 6 and 7*, KPMG for EPD/MIG, October 2000 http://www.nemmco.com.au/future/retail/709-0011.htm

[18] *Op Cit,* p12

An earlier paper prepared for the Victorian Government by Ernst and Young[19] says *that there are three clear objectives, in the following order of priority:*

- *the introduction of a fully competitive retail market;*
- *that trading arrangements are the most cost effective available; and*
- *that minimal obstacles are created for either new retailers or customers in switching supply.*

Ernst and Young also identified and endorsed four supplemental objectives, the last two of which were suggested by the distribution businesses (DB) and meter manufacturers. These included:

- *deliverability against the timetable set by Government statute;*
- *delivering economic benefits through reducing wholesale purchase costs;*
- *cost reflectivity and price signalling; and*
- *capacity for market evolution.*

Ernst and Young stated that the latter two requirements *are particularly important to Victoria where summer peak Pool price volatility creates a need properly to allocate the additional peaking costs produced by various load types including air conditioning. Any cost reflectivity achieved would therefore need to be represented in price offers in order for customers to benefit from them and interval metering will be an important tool in achieving this.*[20]

The objectives specified in the KPMG and Ernst & Young papers are complex. However, none clearly aims to deliver on the primary objective of electricity industry deregulation - real material benefits to consumers. Jurisdictional objectives for FRC focus on the challenges of achieving (what is proving to be) a *"very tight timetable"* for FRC within the pragmatic polemics of inter-jurisdictional inconsistency. We recognise these objectives address very substantial practical and administrative issues, but suggest that they should not be the objectives that dominate the considerations of policies affecting FRC.

It is far more relevant and important to consumers that policies that determine FRC have as a clear primary objective of ensuring that consumers get real material benefit from competition. The ACCC, as the only truly independent decision making agency in the NEM,[21] has an important role in ensuring that objective takes its rightful place in the debate; and ensuring that it is achieved. We argue that this objective is more likely to be achieved if policies are put

[19] *Review of the Victorian Distribution Businesses' Preferred Trading Arrangements:*, Ernst & Young for Victorian Department of Treasury and Finance, June 1999, p4. http://www.nemmco.com.au/future/retail/709-0010.htm

[20] *Op Cit*, p5.

[21] Neither Pareto nor the CEC implies any specific criticism of other decision making bodies within the NEM governance arrangements. However, it is of concern that jurisdictional governments have a conflicted role in the NEM as asset owners and as "owners" of the NEM governance bodies. It should also be of substantial concern to the ACCC that jurisdictional governments are quite clearly "constructing" barriers to effective development of a truly competitive retail electricity market. No two jurisdictions impose the same obligations on retailers; this alone will increase the cost of retail competition across the NEM and act as a barrier to entry into "jurisdictional" markets.

in place that will accelerate the introduction of low-cost, remotely-read, interval meters for all consumers. However, such an outcome will require fundamental changes in the direction of current policies affecting the choice between load profiling and interval metering.

We also note that none of the objectives for FRC have any links between operation of a competitive electricity market, consumer interest in lowering energy bills through active load management and government policy objectives for greenhouse gas emissions.

It seems clear that policy linking market outcomes to environmental outcomes has been subsumed in Australia and overseas by consideration of the administrative arrangements necessary to settle the wholesale electricity market and allow small consumers to change retailer. The material in this report seeks to provide factual evidence that could initiate a positive first step in developing FRC policies that sensibly link economic efficiency of the market and access to technologies that could help consumers reduce energy bills by convenient and automatic load management.

If that first step can be made, it would then be possible to examine development of market-based policies that reduce greenhouse gas emissions without compromising economically efficient outcomes.

1.3 Structure of this submission

Sections 2 and 3 provides an outline of current policy that has lead to the view expressed by the Federal Minister for Industry, Science & Resources in a letter dated 1 March 2001 to the Victorian Minister for Energy & Resources. This report demonstrates conclusively that two key aspects of current policy are based on incorrect advice by jurisdictional governments to the Federal Minister.

Section 4 presents a brief summary of findings from the report by Intelligent Energy Systems to the Victorian distribution businesses. This report contains the most comprehensive analysis yet undertaken of the costs and benefits of interval metering, Despite its conservative estimates of costs and benefits, IES has concluded that consumers would gain a net benefit from roll-out of interval meters in Victoria. The analysis in this report could be improved, but it is of concern that IES's central message has been misunderstood and misinterpreted by advisors to jurisdictional governments.

Section 5 summarises the results of a detailed worldwide search for information on the actual cost and estimated benefits of large-scale interval metering roll-outs. This shows that low-cost, remotely-read interval roll-outs are feasible and, in fact, are occurring or will commence shortly in Italy, Wisconsin and Puerto Rico. These roll-outs are occurring at very much lower average unit costs than suggested by all of the consultants' reports to jurisdictional governments.

Section 6 outlines two other areas of substantial concern to consumers that have not been adequately address by the jurisdictions; and section 7 summarises recommendations for change in current policies to maximise the chance that consumers will benefit from FRC.

It is emphasised that funding available to consumer groups has limited their ability to provide input and respond to policy development affecting FRC. It is simply not possible in the current climate for consumers to effectively fund research, analysis, comment and policy suggestions to a level that allows their interests to be fully represented in regulatory processes. Nor has it been possible for Pareto to provide fully effective support on a *pro bono* basis. However, every attempt has been made to provide useful comment and input to the current decision making process, and to assist in formulation a sound policy.

2 BACKGROUND - THE TIMETABLE FOR FULL RETAIL COMPETITION

Beginning in January 2001, all consumers in NEM jurisdictions using less than 160MWh/y will progressively enter the competitive retail market. These consumers, like others already in the competitive retail market, will be free to choose a retail supplier of electricity.[22]

The timetable for FRC shown in Table 1 is dictated entirely by political decisions of individual jurisdictional governments.

Table 1: Timetable for contestability in the NEM

Tranche criteria	New South Wales	Victoria	Queensland	South Australia	ACT
>40GWh/y[a]	Oct 1996 47 sites	Dec 1994 47 sites	Mar 1998 43 sites	Apr 1998	Oct 1997 5 sites
>4GWh/y[b]	Apr 1997 660 sites	Jul 1995 330 sites	Oct 1998 430 sites	Dec 1998 160 sites	Mar 1998 40 sites
>750 MWh/y	Jul 1997 3,500 sites	Jul 1996 1,500 sites	Not classified	Jul 1999 635 sites	May 1998 250 sites
>160 MWh/y	Jul 1998 10,800 sites	Jul 1998 5,000 sites	Jul 1999 6,400 sites	Jan 2000 2,600 sites	Jun 1998 1,000 sites
>40 MWh/y[c]	Jan 2001	Jan 2001	Not classified	Not classified	Jan 2001
Remaining customers[c]	Jan 2002 2.7M sites	Jan 2002 1.96M sites	TBA 1.4M sites	Jan 2003 720,000 sites	Jan 2002 125,000 sites

Source: National Competition Council 2001, Office of Regulator General (Vic), Department of Mines and Energy (Qld), Independent Industry Regulator (SA), Market Implementation Group (NSW).

Notes: a Customer size criteria in Victoria was 10MW maximum demand for 1st Tranche contestability
b Customer size criteria in Victoria was 1MW maximum demand for 2nd Tranche contestability
c Timing for last Tranche in Victoria revised in late 2001 to align with NSW & ACT.

In late 2001, the Victorian government amended the timetable to align with the program established by the NSW and ACT governments. This amendment delayed FRC in Victoria by one year for the smallest consumers (all those below 40MWh/y).

This is not the first time a jurisdictional government has delayed or re-scheduled FRC. The changing timetable for FRC indicates that the timing is a matter of politics, not of necessity

[22] So called contestable customers are permitted under the National Electricity Code to buy energy directly from the NEM, although NEMMCO charges and fees will act as a major barrier to entry for consumers using less than 160MWh/y. Only one end-use customer directly participates in the NEM at present.

nor of economics. There would appear to be no reason that the ACCC should assume the timing for FRC is "fixed in stone". This, in turn, leaves open the option for the ACCC to consider whether FRC should be delayed until appropriate policies and/or infrastructure is in place to allow consumers access to a full range of benefits that retail competition might deliver.

Competition is meant to deliver benefits to consumers by allowing them to choose a supplier that best meets their individual needs. Through choice, consumers encourage suppliers to develop products and services that meet needs defined by the consumers. This gives consumers economic power that not only determines the quality of products and services on offer but also the price. In truly competitive markets, this process can deliver substantial and sustainable social benefits.

Electricity is unlike any other product or service that consumers use. Access to, and use of, electricity is essential for participation in our society; and electricity has peculiar characteristics that intimately link the choices consumers make with its production.

- Electricity must be generated and delivered at the same time that it is used because it cannot be easily stored.
- The quantity required at any one time can vary dramatically over relatively short periods and throughout the year.
- The cost of producing electricity is not constant. Some producers may be able to operate all the time and recover their costs at low average prices, and others may be required to operate rarely - say during short periods of high (or low) ambient temperature - and **must** recover their costs through high average prices.
- These attributes (and the arbitrarily defined market rules in the National Electricity Code (Code)) dominate the way the wholesale price is set in the National Electricity Market (NEM). The wholesale market price is set every half hour and is permitted (by the Code rules) to vary from minus $1.00/kWh to $5.00/kWh[23]; an extreme range compared to the average "retail price" to consumers of less than $0.03 for Off-Peak electricity and around $0.06/kWh for Peak electricity.

There are other characteristics of electricity supply that create considerable challenges for consumers and for a competitive retail market in electricity. For nearly 80 years,[24] consumers in Australia have expected electricity to be available, always and at a (relatively) uniform price **and the supply infrastructure used to deliver electricity to small consumers is "hard-wired" as though this paradigm would always be true**. However, the move away from a State-controlled, regulated supply regime to a (partially) privatised, competitive market regime has fundamentally changed the environment in which that paradigm was

[23] From April 2002, the maximum wholesale market price will be permitted to rise to $10.00/kWh - around 2-300 times the average price that consumers might expect.
[24] The State Electricity Commission of Victoria commenced supply from Yallourn Power Station in 1924.

established. In this new, "pro-consumption" environment, the absence of realistic economic signals that link cost to price is:

- creating the need for more private investment in rarely used extreme peak generation plant in the southeast Regions of the NEM;
- also driving up the average cost of electricity without any sensible feedback to consumers that links cause and effect; and
- handing enormous market power to producers in times of supply constraint.

Not only do small consumers currently receive no effective price signals, but the "hard-wired" supply infrastructure provides no convenient way for them to respond. The absence of, and the inability to respond to, price signals dis-empowers consumers and can leave them at the mercy of unscrupulous suppliers in a competitive market. It also creates potentially enormous risks for retailers - risks that **must** be passed onto consumers one way or another if retailers are to survive.

On the other hand, giving consumers access to technology and infrastructure that delivers price signals **and allows them to respond easily and conveniently to those signals** would allows consumers to exercise **true choice**[25] in a competitive electricity market. Limiting competition to **choice of retailer without change to supply infrastructure** - and this is all that consumers are being offered by jurisdictional governments and regulators with the so-called *Net System Load Profile* - is not sufficient to give consumers access to the full benefits of a competitive electricity market.

[25] In almost every other area of competition, consumers are able to respond to varying prices of the products and services they buy; such as for fresh fruit and vegetables, household goods and petrol to name just a few. Consumer reaction to price creates the economic pressure that "forces" competing suppliers to respond to consumer demands.

3 CURRENT POLICY DIRECTION

Current policies affecting the role of load profiling and interval meters in full retail competition (FRC) are encapsulated in a letter from the Federal Minister for Industry, Science & Resources to the Victorian Minister for Energy & Resources. This letter, dated 1 March 2001, includes the statement:

> *"In the Commonwealth's view, interval metering provides the most effective solution in the medium term. It has the potential to enhance price competition and to provide retailers and customers with time-of-use price signals. Interval metering will also encourage the development of more effective demand side management technologies.* ***However, I am advised that there is not yet a proven, cost effective interval metering solution for individual households****, nor would it be possible to achieve a mass roll-out of interval meters without substantially delaying the introduction of full retail contestability.*
>
> *Given these limitations, I acknowledge that there is a need to adopt a net system load profiling arrangement in the short term that permits the timely introduction of full retail contestability with existing accumulation meters. It is important however that that this approach also preserves* ***market-based incentives*** *for the subsequent introduction of interval meters."* (Emphasis added).

The findings presented in this report demonstrate conclusively that the Minister has been incorrectly advised in regard to the possibility of mass roll-out of a "proven, cost effective interval metering solution for individual households."

The findings presented in this report also demonstrate that *"market-based incentives"* **have not yet delivered large-scale interval meter roll-outs anywhere in the world, despite the undoubted benefits that such technology could allow consumers to access.**

The report also addresses the concerns of consumer groups that the timetable for FRC is being driven by political ideology, and not by objectives that seek to maximise benefits to consumers. We argue that this is a matter that the ACCC should consider when it assesses the Public Benefit of changes to the National Electricity Code (Code) that will be required to authorise metering and/or load profiling for FRC.

We also argue that the ACCC cannot and must not authorise Code changes for FRC until an effective market power monitoring and mitigation program is implemented in the NEM.

3.1 The basis for current policy

The basis for current jurisdictional policy is presented in a paper prepared by KPMG for the Energy Project Division of the Victorian Department of Natural Resources and Environment (EPD) and the Market Implementation Group of the NSW Treasury (MIG).[26]

3.2 Cost estimates for interval meters

All of the consultants' reports available to jurisdictional government[27] make a reasonable "fist" of summarising the equity and economic efficiency benefits that interval metering could deliver. Regulators and jurisdictional Governments in Victoria and NSW have formed a collective view that wide scale roll-out of interval meters will not occur in the early stages of FRC because information in these consultants' reports suggests the cost of interval-metering systems is too high for most consumers to benefit.

The estimated costs suggested by these consultants have been summarised in Table 2 of the NSW Treasury Discussion Paper of August 2000. This cost summary was referred to in the KPMG paper and, presumably, represents the latest position of the jurisdictions on estimated costs. The relevant table is reproduced below.

Table 2: EPD/MIG Reference summary of interval meter cost estimates ($A)[28]

	Single phase meter	Three phase meter
Capital cost		
Meter	$100 to $200	$250 to $500
Meter installation	$50 to $100	$50 to $100
Total capital cost	$150 to $300	$300 to $600
Annualised capital cost[1]	$20 to $40	$40 to $79
Est. maintenance cost per annum	2% of capital cost	5% of capital cost
Reading & data aggregation cost per annum	$8[2]	$60[3]
Total estimated annual cost of metering	$30 to $52	$113 to $164

Source: NSW Treasury estimates based on costs presented in the PHB & Lacuna Consulting, SRC International, and IES reports.

1 Costs are amortised over 15 years at a 10% discount rate.

[26] *Joint Issues Paper, Metrology Procedure for Metering Installations Types 5, 6 and 7*, KPMG for EPD/MIG, October 2000

[27] *Development of a Conceptual Metering and Settlement Design for Full Retail Competition in the National Electricity Market*, PHB-Lacuna report to NEMMCO, 11 December 1998, URL: http://www.nemmco.com.au/future/retail/838.htm
Contestability For Residential and Other Low Use Electricity Customers, SRC International report to IPART, December 1998, URL: http://www.ipart.nsw.gov.au/ (Reports-Electricity-RP12)
Introduction Of Full Contestability In Electricity Supply: Review Of Proposals For Metering And Settlement, PHB-Hagler Bailley report to Victorian EPD, 21 July 1999, URL: http://www.nemmco.com.au/future/retail/709-0013.htm
Review of the Victorian Distribution Businesses' Preferred Trading Arrangements:, Ernst & Young report to Victorian Department of Treasury & Finance, July 1999, URL: http://www.nemmco.com.au/future/retail/709-0010.htm
Evaluation of Metering Strategies for Full Retail Contestability, Intelligent Energy Systems report to Victorian Distribution Businesses, December 1999, URL: *http://www.nemmco.com.au/future/retail/1336.htm*

[28] *Metering and Settlement Strategies for Full Retail Competition* - ***Discussion Paper,*** NSW Treasury Full Retail Competition Group, August 2000, p12.

2 Assumes quarterly meter reading at A$2 per read. A survey of existing meter reading costs for NSW distributors suggested an average in the range of A$1.00 to A$1.50 per customer per quarter with an additional cost of between A$0.50 to A$1.00 to download the quarterly interval data as opposed to a normal basic read.

3 Assumes monthly meter reading at A$5 per read as three phase supply tends to be used by larger business customers. Monthly reading costs are higher as these customer sites are more widely dispersed than for smaller customers.

In commenting on the above cost estimates, the SA Independent Industry Regulator[29] notes that *(t)he cost ranges shown reflect different meter specifications and assumptions about meter rollout:*

- *for single phase meters, the higher end of the range is for two element meters capable of switching and separately measuring off peak consumption, while the lower estimate reflects the cost of a single element interval meter (not currently produced by meter manufacturers);*
- *for three phase meters, the higher end of the range represents the costs of existing electronic interval meters currently used in the above 160 MWh market without communication equipment; and*
- *the range of installation costs quoted represents the differences that may be incurred if meters are installed on an individual basis or as part of a mass roll out. The Victorian distribution businesses, for example, suggested that an installation cost of $25 per site would be achieved for a mass roll out of meters.*

We also add that the majority of the estimates in the consultants' reports are based on "indicative cost" and rely on "industry experience" of the consultant. Sources for the estimates of interval meter costs are attributed (vaguely) to meter suppliers or ill-defined criteria that rely on "industry experience". Given that the only roll-outs of interval meters referred to by the consultants are those associated with installations of (relatively small numbers of) individual interval meters at large customer sites, it is not at all clear whether that "industry experience" is either relevant or sufficient as a basis for determining policy.

We also note that the consultants generally drew attention to the dynamic nature of interval meter markets and the high probability that unit costs for interval meters were expected to reduce significantly due to technological enhancements, increased volumes and competition by meter manufacturers.

In the next section of this report we summarise the results of our investigation of actual large-scale interval meter roll-outs that provide more concrete information on costs that can be achieved currently. This investigation demonstrates conclusively that the costs for manually read interval meters summarised in Table 2 above are significantly higher than costs achieved in the few large-scale mass roll-outs of interval meters that have actually commenced.

[29] Information Paper no. 5, Metering: Role of Industry Regulator and Evolving Technologies - Paper Prepared at the Request of the Consumer Advisory Committee, SAIIR, February 2001, p8.

We also note in passing that meter suppliers are already offering interval meters suitable of single-phase, single tariff supply to residential consumers in small order lots of only a few hundred meters at prices approaching $100/unit. This pricing has been confirmed by one of the Victorian DBs. Increased order volume and increasing availability of low-cost interval meters from competing suppliers would be likely to see interval meters offered at unit costs well below $100/unit at the present time.

Information presented later in this report shows that prices for large orders of interval meters are expected to be below $65/unit in Italy for state-of-the-art interval meters that incorporate sophisticated two-way communications capability.

3.3 Load profiling

Current policy, as defined in the KPMG paper, will see the majority of consumers being billed for energy use on the basis of a *Net System Load Profile* (NSLP) that will apply to all non-interval metered consumers in a defined geographic area - irrespective of any differences in their individual consumption patterns.

This policy presents significant problems for small consumers because load profiles (particularly a single NSLP) transfers the risk of extreme "cost" volatility in the wholesale market to "host" Retailers. Arrangements are being developed under industry-based and NEMSAT[30] committee processes to ensure that the risks of price volatility are isolated and passed through to consumers. With a NSLP, the wholesale market price volatility risks are "smeared" amongst all non-interval metered consumers and there is no mechanism to identify and reward individual consumers for demand side response.

An outcome of this policy will be that "competition" for consumers without interval-meters will be based on a fixed consumption pattern. Consumer "choice" will be limited to any other "value-added" benefits that competing retailers might offer - not on factors that are primary drivers of the cost of energy. This virtually eliminates the opportunity for individual consumers to exert economic pressure that could drive down the cost of electricity, or to benefit if their individual consumption pattern is better (i.e. uses a greater proportion of energy at times when the wholesale price is low) than the assumed NSLP.

The impact of this stifled incentive for demand response will be particularly severe for consumers in the south-eastern regions of the NEM (Victoria and SA), where the supply-demand balance is becoming increasingly tight. A tightening supply-demand situation will result in more frequent, very high wholesale market prices, sometimes as high as the NEM VoLL Price Cap.[31]

[30] National Electricity Market Settlement and Transfer Committee.

[31] The short-term NEM price cap (VoLL) is currently $5/kWh. This compares to a "normal" average Franchise Tariff energy cost of around $0.05-0.07/kWh. However, the ACCC has approved a change to in the NEM Price Cap formulas that will increase VoLL to $10/kWh after April 2002.

That is, small consumers, even those who do not contribute to price volatility, are likely to face increases in energy costs and those consumers who might be able to reduce or reschedule consumption (and so reduce demand and price volatility) will have no direct access to the benefits this might deliver.

To compound the adverse effects of stifled demand response, interval-metered customers will be exposed to wholesale market price volatility driven, in part, by the behaviour of non-interval metered consumers. This means that interval-metered consumers are likely to be shouldered with the full burden of implementing demand responses that might curtail the price impact.

In theory, this provides an opportunity for those customers to gain benefit from a demand response, particularly during VoLL or near-VoLL events. In practice, many interval-metered customers may not be able to easily modify their consumption choices; and those that could, may not be able to implement sufficient demand response to suppress very high price spikes; particularly as there is already *prima facie* evidence[32] that existing NEM rules allow generators to withdraw or withhold capacity under these conditions so as to mitigate the price impact of demand response. Without a wider spread of incentives for and capacity to implement demand response, all consumers will be exposed to higher prices.

3.4 Metering versus profiling

A key element driving policy development is the estimated cost of interval-metering *vis-à-vis* profiling. Current policy direction is clearly based on the notion that interval-metering costs are too high. But no attempt has been made by jurisdictional policy bodies to assess any difference in benefits that consumers might expect. KPMG make this quite clear in the EPD/MIG Paper. Section 5.5 of the KPMG paper purports to present a comparative assessment of metering versus profiling. KPMG says *(t)he key differences between the two solutions are in relation to the cost (cost of implementation and annual operating and maintenance costs) and accuracy of the half-hourly data produced relative to the actual consumption pattern.*[33]

KPMG then goes on to present an analysis of cost differences that concludes a metering solution would be 600% to 714% more costly than profiling in Victoria and NSW respectively. No attempt is made to identify or quantify any difference in benefits between metering and profiling other than a brief, **but totally qualitative - and second hand**, comment of issues associated with differences in accuracy of time-of-use load.

[32] See EUGA submission to the ACCC "*National Electricity Code VoLL Review, Response To Draft Determination, An End-Use Customer Perspective*", August 2000.
[33] KPMG, p41

KPMG's "analysis" of the accuracy issue is summarised in the following extract[34] attributed by KPMG to the Victorian Electricity Load Profiling Study, Trowbridge Consulting, March 2000.

The arguments made in favour of a metering solution are that the improved accuracy of the metering solution:

- *enables retailers to better allocate costs to individual consumers and to negotiate deals with individual consumers;*
- *can eliminate the cross-subsidising of one customer by another within the aggregate of customers;*
- *enables the customer to receive more detailed price signals;*
- *provides information to distributors which will assist in network planning and possibly the future pricing of network services; and*
- *encourages the introduction of value added services.*

However, there are a number of flaws with these arguments, such as:

- *the level of consumer class cross subsidies is generally small in the energy component of retail tariffs compared with the magnitude of cross subsidies inherent in network charges;*
- *the energy cost component of an electricity bill which would be impacted by the cross subsidies is only one component of the total electricity bill; and*
- *as a result, the difference between the energy cost as calculated using profiling (net system load profile), and that using metering will be relatively small in terms of the consumer's annual bill (current average bill in Victoria is about $600 per annum).*

This is an incomprehensibly simplistic basis for assessing the comparative merits **to consumers** of a metering or profiling solution. Individual consumers would not receive the same benefits from profiling and metering solutions; yet no attempt is made to assess any differences in benefit. A further criticism of KPMG's acceptance of these arguments is that absolutely no evidence is presented to support these assertions and no attempt has been made to present or comment on alternative views presented by authoritative parties.

Not only is the "analysis" by KPMG simplistic, but it totally ignores the work undertaken by IES for the Victorian DBs - even though KPMG refers to the IES report on a number of occasions.

By contrast, in one of its submissions to ORG's 2001 Electricity Distribution Price Review, United Energy asserted that ***a 2.4 kW domestic air-conditioning unit costs $240 per year in generation, transmission and distribution capacity costs. This represents a $180 cross***

[34] *Op Cit*, p45

subsidy to each "air-conditioning" customer, paid by three non -"air-conditioning" customers at up to $60 each. United Energy attributes this assertion to an interpretation of the IES report.[35]

This suggests a cross-subsidy in favour of AC users equivalent to around 10% of non-AC users annual bill and directly contradicts the bland and qualitative statements accepted by KPMG that *the level of consumer class cross subsidies is generally small in the energy component of retail tariffs compared with the magnitude of cross subsidies inherent in network charges*.

We are not aware of any analysis or commentary that has been undertaken of the IES report. Nor are we aware of any reason why United Energy's assertion should be discounted. On the contrary, United Energy's interpretation of IES's work seems both reasonable and sensible - **and provides a compelling *prima facie* case for the roll-out of interval meters to every user of reverse cycle air conditioning.**

Nor do we believe it is acceptable to dismiss an opportunity to deal with the issue of cross-subsidies in the energy component on consumers bills simply because there are cross-subsidies in network components. Network pricing, particularly distribution network pricing, could be restructured to deliver greater overall benefits to consumers by incorporating economically efficient price signals linked to individual consumers demand, but there are essential differences in the equity issues associated with cross-subsidies in energy and network costs.

- Individual consumers can have far greater control over energy consumption choices than they can have over network choices. There is no clear reason why a consumer who chooses to modify their energy consumption pattern to lower costs should subsidise those consumers who choose not to do the same thing.
- So long as all consumers require access to the network for electricity supply, there is a portion, possibly a substantial portion, of network cost that should be legitimately shared by all consumers. If the cross-subsidies in network tariffs are inequitable or lead to economically inefficient outcomes then regulators and distributors should examine ways to change network tariffs to address these issues.[36]

3.5 Outstanding policy issues - the jurisdictional perspective

The KPMG paper identifies issues that the Victorian and NSW jurisdictions agree need to be addressed in order to finalise preparation for FRC. The paper confirms that the jurisdictions

[35] *2001 Electricity Distribution Price Review -Submission to the Office of the Regulator-General*, United Energy Ltd, 1 December 1999, p73.
[36] It should be noted that some distribution businesses have commenced introduction of tariffs that attempt to address these issues. For example, on 1 January 2001 United Energy introduced new Distribution Tariffs that aim to substantially address network cross subsidy issues. In particular United is providing a new tariff for small customers who choose to install interval meters that will provide benefits if they also choose to modify their behaviour during high network demand periods in the summer.

intend to proceed with FRC on the basis of load profiling for the majority of small consumers and says that the main unresolved issues (with profiling) are:

- *Geographic extent of the profile - which was an unresolved issue only for Victoria since NSW has already decided to define profiles by DB area;*[37]
- *Netting-Off of 1st Tier interval metered and un-metered load;* ***and***
- *Peel-Off of separately (cumulative) metered consumption, but which is not available on a half hourly basis. Peel-off loads cover Off-Peak Hot water, Storage Space Heating and Two-Rate metered loads in Victoria; and Off-Peak "controlled load, "extended hours" controlled load and time-of-use metered load in NSW.*

"Peel-Off" refers to the process of establishing a series of layered load profiles for different load types (or different non-interval meter types). For example - a non-interval metered consumer with controllable hot water heating can be assigned a separate load profile for the hot water load, and another for general consumption. This addresses some of the inequitable characteristics of load profiling, but also introduces greater complexity and requires a level of intrusion into the affairs of consumers if the "peel-offs" are to be accurately applied.

That is, it would appear that consumers could only be assured of having their interests protected if there was direct regulatory oversight and audit of NSLPs. This suggests that a "first-best" policy would be to promote roll-out of interval meters to all consumers. Providing consumers had adequate access to information about the impact of their energy consumption choices, they would have the option of "protecting" themselves through competition and changes in consumption behaviour; minimising the need for regulatory oversight of that aspect of the retail market. A second-best policy would be to target consumers with high-cost energy consumption patterns as recipients of interval meters. Such consumers would be expected to be reverse-cycle AC users in the first instance. However, both retailers and the high-cost consumers would have to put up with a higher level of regulatory oversight as there is no obvious incentive for either consumers or retailers to voluntarily accept high cost options simply because this is more equitable.

3.6 Predilection for manual reading of interval meters

Current policy appears firmly committed to manually reading of interval meters - if roll-out of interval meters occurs at all. This is primarily for practical reasons in that FRC for small consumers will extend to all consumers from 1 January 2002 in both Victoria, NSW and the ACT. It is simply not possible to get a "mass-market", remote reading system in place before small consumers enter the competitive retail market on 1 January 2002. Therefore, any interval meters installed for small consumers will have to be read manually as an interim measure.

[37] This issue has also been resolved in Victoria. Load profiling will apply to distribution area geographic boundaries.

It is also a technical issue in that no information has been presented to policy makers that suggests a low-cost, remote reading system either exists or is possible. The examples of large-scale interval meter roll-outs underway in Italy and Wisconsin described in the next section both include low-cost systems for remote reading of interval meters. These are based on different versions of Power Line Carrier technology that use low voltage distribution conductors to carry signals to and from the meters.

Even the most optimistic program assumed by IES is based on a 10 year effort on interval meter roll-outs. This is, presumably, based on existing capability and work/management practices in the regulated monopoly DBs where current regulations allow only specially authorised DB personnel to install, inspect or repair meters. A different approach is obviously possible (say, by allowing any registered electrician to replace meters).

Wisconsin Public Service in the US is in the process of rolling-out remotely read interval meters to all of its 400,000 (approximately) electricity customers over the next 18 months; and that ENEL in Italy intends to roll-out remotely read interval meters to 31 million metering points over a three year period commencing July 2001. If "high-speed" large-scale roll-outs are possible in the US and Europe, they are also clearly possible in Australia.

3.7 Competition in metering services

Current policy is based on using competition wherever possible for all aspects of electricity service delivery on the assumption that this is more likely to deliver benefits to consumers through innovation and economic efficiency. However, NEM jurisdictions have taken an inconsistent policy position in regard to regulation of meters and metering services. This policy inconsistency is reflected in the way relevant provisions of the Code have been implemented, noting that the Code focuses wholly on metering data management for settlement of the wholesale market rather than on delivering benefit to consumers.

Currently, basic accumulation (and demand) meters are considered to be part of the regulated distribution network service providers' regulated assets. With introduction of contestability, that policy has changed progressively - with different applications for different classes of contestable customer. The result is an arbitrary and inconsistent policy that is likely to produce undesirable economic outcomes by denying small consumers access to all of the benefits that interval meters might deliver.

- Provisions of the Code require contestable customers with energy consumption above 750MWh/y to have a remotely read interval meter installed whether they change retailer or not. The new interval metering was installed by the customer's preferred retailer and paid for by the customer (or the retailer) under the terms and conditions of the "negotiated" contract between the retailer and the customer.
- Contestable customers in the 160-750MWh/y tranche had some option as to whether they "had to have" a Code compliant remotely read interval meter installed. Only customers who changed from their "host" retailer were **compelled** to have a remotely read interval meter. Other customers in this tranche - those who remained with their

"host" retailer - could decide to have a remotely read interval meter installed (for which they paid) or not.

This policy was aimed on ensuring the integrity of the wholesale market settlement system, a system that relies very heavily on accurate allocation of energy consumption to each retailer for each half hour trading period. The policy relied on competitive pressure to keep metering costs down and stimulate innovation in metering services. The policy also aimed to eliminate anti-competitive bias in the retail market created by the conflict of interest in the relationship between the distribution and retail arms of incumbent DBs.

In cases where interval meters were installed at the retailers' cost, or where the retailers retained ownership of the meter under the terms and conditions of the "negotiated" retail contract, it was common (possibly universal) that meters were changed when the consumer changed retailer. This is referred to as "meter churn".

A secondary (and one might argue, indirect) aim of these policies was to ensure that consumers could benefit from retail competition through access to and control over half-hourly metering data. It was correctly recognised that information on an individual customer's energy consumption pattern was key to that customer gaining benefit from competition. If that information stayed with the customer - or their retailer - and not the monopoly distribution network service provider, the customer would be more likely to "benefit" from retail competition - without direct regulatory intervention or oversight of metering services.

However, the policy breaks down as a consumer's total expenditure on energy declines because the cost of installing (and "churning") individual, remotely-read interval meters (using telecommunications systems to read the meters) is exorbitantly high compared to the material benefits that individual small consumers might obtain from retail competition.[38] When the cost of metering is higher than any saving an individual consumer might achieve through competition then neither competing retailers nor the consumer has any incentive to pay for an interval meter. Nor is there clear justification for any policy that required consumers to pay for interval meters if, on the whole, they get no net benefit.

Meter churn also creates a clearly undesirable economic consequence. As a minimum, it incurs the cost of the "old" retailer removing the existing meter and the "new" retailer installing a new meter. This may create an insignificant impact on retailers with margins substantially greater than the cost of meter churn, or on consumers whose total energy bill is vastly greater than the meter churn cost. However, for small consumers any avoidable incremental cost can have a substantial effect on retail margins and on the benefits that consumers may get from competition.

[38] Customers using more than 160 MWh per annum who change retailers are currently required by the Code to install a sophisticated meter that measures consumption in each half hour (interval meters), and which can be read remotely on a daily basis via a telecommunications network. The annual cost for metering services (provision and maintenance of the meter, remote meter reading and data aggregation) associated with the sophisticated metering is approximately $800 - $1,000 per annum which is a relatively small percentage of their electricity bill, which is generally greater than $16,000 per annum.
Metering and Settlement Strategies for Full Retail Competition – Discussion Paper, NSW Treasury, Full Retail Competition Group, August 2000, p 5

The only practicable way of achieving a low unit cost for interval meters is by installing them in a mass roll-out and eliminating meter churn. The next section of this report summarises the international experience that supports this conclusion.

Jurisdictional policy makers are still considering how "best" to regulate metering services for small consumers. For example, ORG "removed" small consumers' meters from services provided through regulated distribution use of system (DUoS) charges in its recent electricity distribution price determination. Small consumer metering services in Victoria are still regulated, but as a separate Excluded Service (i.e. a service provided by a monopoly regulated business, but **excluded** from DUoS charges).

ORG left open the option of competition in the installation and (presumably) ownership of interval meters for small consumers. ORG justified this on the basis that *(i)nterval metering services have already been made competitive in the above 160 MWh/year market. The Office believes that it would be difficult to justify why interval metering services in the above 160 MWh/year market segment should be competitive but that interval metering services in the below 160 MWh/year market should be retained as a DB monopoly. It is therefore the view of the Office that interval metering services in the below 160 MWh/year market should also be capable of being competitively procured. This view applies both to provision of interval metering and to data services relating to interval metering*.[39]

The lack of analysis indicated by this statement is disturbing, suggesting that the basis of ORG's policy position is ideologically driven. The ideology being:

- policy consistency between contestable tranches - whether this makes financial or economic sense to consumers or not;[40] or
- competition is always better than regulation - despite compelling evidence (and basic economic sense) that competition of this type cannot deliver greater efficiency at the small consumer end of the market with meter "churn" costs at levels comparable to the potential benefits gained by consumers from competition.

Experience in the UK and the many US jurisdictions that rely on competition to drive innovation in metering services has been that competing retailers do not install interval meters for small consumers. This appears to be because the risk of losing on the investment outweighs any potential rewards. Nor do consumers show any inclination to "buy" interval meters - as they do mobile telephones, home computers and other "high-tech" gadgets. This reluctance to invest in interval meters reflects a rational assessment of investment risk by retailers with small margins, and the relatively high cost of "surgically" installing (and "churning") individual installed meters. It is also possible that lack of understanding by consumers of the functioning and risk/reward relationships in a competitive retail market also adds to the inertia that stalls interval meter roll-out.

[39] *Consultation Paper No 4,* Electricity Retail Competition For Small Customers - Customer Metering, Office of the Regulator-General, May 2000, p16.

[40] It is noted, however, that NSW appears to be headed down the path proposed by the Victorian DBs and rejected by ORG that new and replacement meters should be interval meters - installed and owned by DBs.

Most of the consultants' reports available to jurisdictional governments set out simple, but powerful arguments against allowing competition for meter ownership for small consumers. In summary, the arguments are that it is not possible to capture economies of scale in "surgical" meter installations, and that increased unit costs tend to outweigh any other benefits that might be delivered through "innovative" metering solutions - at least at current metering costs. Several of the consultants reports provide examples that suggest "competition" is not always beneficial - or that it is very likely to stifle roll-out of interval metering.

Regulators rely on innovation and competition to drive installation of interval meters for legitimate and worthy reasons; but nowhere in the world is there any evidence that innovation and competition in the retail sector actually leads to wide-scale roll-out of low-cost interval meters. Given the widespread consensus that access to interval meter technology would allow consumers to gain access to the benefits of retail competition in electricity, such a policy stalemate is not in the interests of consumers.

It is some relief to Victorian consumers that EPD is seeking to modify the Victorian derogation from the Code to make local network service providers the exclusive responsible persons in relation to manually read interval meters, existing accumulation meters, and un-metered supply[41] for a transitional period of three years following the introduction of FRC.[42] However, this request for amendment to derogation still leaves open the question of how low-cost, remotely read interval meters should be treated - if such technology was introduced.

3.8 Desire for technological neutrality

Current policy also includes a preference for "technological neutrality" in respect of interval meters. This means that no vendor solution will get "official" endorsement by policy makers based on a specific technology. The argument in this case is that technological preference stifles innovation, inhibits competition between retailers (or, at least, reduces access to competition as a driver for economic efficient outcomes), and may simply transfer monopoly power to the technology owner.

Attempts by the Victorian DBs to establish a generic functional specification for a minimum "standard" interval meter floundered because of regulatory concern about "technological bias" in the generic specification. The impact of this policy interpretation (combined with decision on metering in the recent electricity distribution price review) is to stall efforts to promote interval meter roll-out.

As discussed later, this aspect of "competition" policy is likely to inhibit achievement of outcomes similar to those achieved in Italy, Wisconsin and Puerto Rico where decisions have

[41] Referred to in the Code as metering installation types 5 = manually read interval meters, type 6 = manually read accumulation meters, type 7 = un-metered supply. Remotely read interval meters are referred to as type 4 meters.

[42] *Application to the Australian Competition and Consumer Commission, Proposed Derogations to the National Electricity Code Transition to Full Retail Competition*, Victorian Department of Natural Resources and Environment, 19 March 2001

been made by individual monopoly network businesses to undertake universal roll-out of interval meters adopting one particular technology across their whole service territory.

We accept that market participants should make decisions about the best technical solutions for their business; and that regulators or jurisdictional government should not become intimately involved in those decisions. However, there would appear to be considerable merit in further development of a generic functional specification for a low-cost, remotely read, interval meter system that could be used right across the NEM, particularly one that removed as many of the obstacles as possible to reducing the unit cost of such a system.

In support of such an approach we note that in the UK, Italy and the US basic, electronic accumulation meters, identical to those than can be modified to incorporate interval meter capability, can wholesale for as little at AU$30/unit. These costs are applicable to large orders of more than several thousand meters in markets where there is potential to sell millions of meters. Figures suggested by meter suppliers and DBs in Australia for the same types of meters are substantially higher in a range between $100 to $170/unit.[43] The scope of work for this assignment did not include an examination of this issue, but it appears that major contributors to this cost differential are the small volume of orders (sometimes as few as several hundred meters being ordered at one time) and the slight, but significant differences in detailed specification of (what consumers would see as) non-essential attributes of the meters, such as mounting arrangements or location and type of fasteners for supply conductors - that differ between jurisdictions.

Small volume orders of "individually" specified meters may prevent any manufacturer or supplier from being able to achieve optimum economies of scale, a fact reflected in the price of the meters.

It is also likely that "efficiency" incentives in CPI-X distribution pricing regimes inhibit DBs voluntarily replacing larger numbers of aging accumulation meters, or voluntarily adopting policies that use interval meters for all new and replacement installations.

- A primary incentive in these regimes is to minimise both capital and operating costs. If an existing electro-mechanical accumulation meter is serviceable, there is no incentive to replace it no matter how old it might be - provided samples from the population of meters of the same type and age pass routine (but infrequent) accuracy tests.
- Even if there is a need to replace a meter (or install a new meter), there is no incentive for a distributor to install a meter that is more likely to deliver benefits to consumers - unless that meter just happens to be the lowest cost meter available in the market.

This suggests that regulators and policy makers **need** to intervene and establish policies that are more likely to ensure that consumers can gain access to the benefits that might accrue

[43] These costs are similar to those contained in Table 2 of the NSW Treasury Discussion Paper of August 2000. The higher cost electronic meters include capability for time-switched Off-Peak hot water load. We have been advised that these meters are now being supplied with interval meter capability.

from all segments of the electricity supply industry. That is, policies are needed that allow consumers to accrue benefits from competition in the energy market that outweigh costs that might be incurred in the regulated monopoly sectors.

However, we do note that ENEL SpA in Italy expects to recoup the benefits of its three year, $3.6 billion investment in a state-of-the-art, two-way communications system and interval meter roll-out in just 4 years through improvements in its distribution and (competitive) retail business. The functionality of the technology in this roll-out - similar to a Power Line Carrier based internet system - has already been proved in a trial conducted during 1999-2000 and will be offered to the "market" (including ENEL's own distribution and retail arms) through a wholly owned, but independent subsidiary that will be required to meet Third Party Access provisions under European Commission law.

The observation above suggests that regulators (and distributors) need to closely examine the incentives in network pricing regimes to ensure that investment in network technologies that will deliver benefits to consumers does occur. As a minimum, regulators and policy makers should be ensuring that every aspect of policy that may contribute to an increase in metering costs is examined and, if possible, changed.

With international markets demonstrating that sophisticated, communications capable interval meters can be delivered against large volume orders for unit prices at of below $60-65/unit - a price that strongly suggests that consumers "on average" would benefit from FRC, every effort should be made to develop policies that would ensure similar outcomes are possible in Australia.

3.9 Impact of current policy options on greenhouse gas emissions

The Australian Greenhouse Office (AGO) expressed interest in an objective comparison of profiling and metering options with regard to the incentives for customers to reduce overall electricity consumption and greenhouse emissions. This was not explicitly included as part of the scope of work for this assignment, but it is possible to make some preliminary observations in this area.

Comparisons of different metering and profiling options are provided in reports prepared by other consultants. In particular, the Trowbridge[44] report for the Victorian electricity distribution businesses looks at different profiling options in considerable detail. However, none of these appear to consider a link to GHG emissions. Nor did our own investigations yield other material that linked use of profiles or interval meters with changes in GHG emissions.

However, we found no evidence that use of load profiles (even the most sophisticated form of real-time dynamic load profiles used in California) provides any clear incentive for consumers

[44] *Victorian Electricity Load Profiling Study, Victorian Electricity Distribution Businesses*, Trowbridge Consulting, March 2000.

to modify consumption behaviour. We have dealt with this very briefly in reference to the situation in San Diego where retail prices for electricity were allowed to rise by nearly 300% (for a brief period) during the 2000 summer. On that basis we consider it unlikely that any form of load profiling could be used to change incentives that would affect GHG emissions. It might be possible to achieve that outcome with load profiles linked to high cost seasonal or time of use pricing, but this would be difficult to implement through a competitive retail market - and would produce inequitable outcomes for those consumers who already act in an environmentally responsible way.

We believe that without interval meters sending economic signals to individual consumers, there will continue to be little incentive for small consumers to change behaviour in a competitive retail market. We have gone further and argued that without (low-cost) two-way monitoring and remote reading/control technology there will be no easy way for retailers to offer convenient and automatic load management services to consumers. If such services were on offer, they could be tailored to reduce bills by reducing consumption - and thus have a greater impact on GHG emissions. Indeed it might even be possible for retailers to create niche markets in this area. We doubt this will occur with load profiles.

The AGO also expressed interest in an analysis of whether price signals provided to customers through interval metering would merely encourage customers to shift peak load consumption to other times of the day or whether it would facilitate reduction of overall electricity consumption and GHG emissions. While not a focus of our investigations, we found very little detailed information on the effect of competitive market price signals on consumption patterns for small consumers. We did come across one report on a trial of prepayment meters in Northern Ireland, and another on the trial of high cost seasonal tariffs in Pennsylvania that suggested direct exposure to price signals could lead to significant load reduction. Reductions in consumption of up to 30% were reported in the Northern Ireland; and consumption reductions of up to 25% were reported in Pennsylvanian. However, neither of these reports appeared particularly relevant to analysis of the interval meter/load profile choice for competitive retail markets.

It might seem incongruous that we refer to two reports that suggest consumers do respond to price signals and later in this paper refer to the experience in San Diego last summer which suggests that price run-ups of over 300% in monthly electricity bills had little impact on consumption.[45]

It would appear that a major difference between these is hat the consumers in the Northern Ireland and Pennsylvania trials were informed about the intention of the trials, whereas San Diegans were thrown off capped retail tariffs into uncontrollable high prices without being informed or understanding why that was happening. San Diegans exhibited a logical response; they rebelled politically and forced the Government and regulator to intervene and

[45] *The Impact of Retail Rate Deregulation on Electricity Consumption in San Diego*, Bushnell, James B. and Erin T. Mansur. , April 2001. URL: http://www.ucei.berkeley.edu/ucei/pwrpubs/pwp082.html

re-cap retail prices. This only reinforces our view that changing consumer expectations is a major issue that will need to be addressed should roll-out of interval meters actually occur.

However, considerable further work is needed to explore how the issues raised by these studies might relate to competitive retail markets. One difficulty with the Northern Ireland report is that it did not address whether pre-payment meter consumers (who tend to be low-income) were reducing consumption through tolerable load management or were subjecting themselves to significant personal inconvenience through self-disconnection. Similarly, the Pennsylvanian study was un-helpful because it referred to a pre-competitive market trial - when there is no incentive in a competitive market for retailers to "offer" high cost tariffs unless they can identify and target individual consumers who might benefit by responding to such signals - something that can't be done equitably without interval meters.

We also note that energy efficiency programs in California anticipate 20-25% reduction in consumption - but this comes through a whole range of measures including weatherisation of buildings, upgrading the efficiency of appliances (including ACs) and lighting etc.[46] Again this is not directly relevant to analysis of the interval meter/load profile choice in a competitive retail market.

However, these examples suggest *prima facie* evidence that some energy service options that might be offered in a competitive retail market (where individual consumers consumption patterns were known) are likely to result in reduced consumption - not just load shifting. In some cases economic signals to small consumers might stimulate load shifting beyond Off-Peak heating loads, but it is more likely that this would occur only if it was convenient. For example, an AC user would not shift load because they want their AC running when it is hot, but they might be "persuaded" to cut consumption by cycling load or even to be interrupted if this was linked to a financial reward; and a consumer might be more likely to shift utility loads (dishwasher, clothes dryer) if this was convenient and automatic.

The primary, short-term environmental benefit of interval meters (particularly in Vic and SA, but also in NSW) is that they could provide a mechanism that would allow consumers to benefit by cycling or interrupting high cost energy loads (such as reverse-cycle ACs). This could obviate the need for further investment in extreme peaking supply capacity; which would, in turn, reduce incentives for consumption of more energy during other times so as to achieve greater economic efficiency in the use of the "spare" (or under-utilised) extreme peak capacity.

[46] The various Californian electricity and gas utilities offer over 170 different rebate programs that aim to assist consumers manage energy consumption - **with load profiles**. The vast majority of these are energy efficiency programs that aim to reduce average energy consumption, not manage energy consumption in very short time periods. For example, a number of utilities offer rebates for reverse-cycle and refrigerant ACs that help consumer “upgrade” to more energy efficient models - but do little to reduce demand levels.

4 COST-BENEFIT ANALYSIS OF PROFILING AND METERING

The IES report presents the best quality analysis of cost and benefits for FRC profiling and metering options, and is the most useful of the background and policy papers. It presents the only attempt to quantify the principle assumption that underpins current jurisdictional policy. That assumption is that **FRC should commence with load profiling, and interval metering should be a secondary consideration, because profiling costs are lower than interval metering costs.**

We have taken the opportunity to present significant extracts from IES' report. We do this because it is quite clear that a number of key points made in the IES report have been incorrectly interpreted in jurisdictional papers. A notable error is that KPMG said *IES concluded that single phase metering costs need to reduce to the current cost of basic accumulation meters (currently about $45) in order to provide benefits to customers compared with installation of basic accumulation meters.*[47] This is a grossly erroneous interpretation of IES' conclusion which was, in relation to the point being referred to by KPMG, that *(a)t expected meter purchase costs, breakeven loads are around 5MWh/year or lower and could justify interval-metering of the larger half of customers or more.*[48]

That is, KPMG (and EPD/MIG) appear to hold the view that interval meter costs would have to drop to the cost of existing electromechanical meters before any consumer would benefit from interval meter roll-out, whereas - **even with what we demonstrate are conservative (i.e. far too high) cost assumptions, and with what we argue are conservative (i.e too low) estimates of benefit** - IES has concluded that a roll-out of interval meters to more than 50% of small consumers in Victoria is justified.

4.1 Scenarios examined by IES

To assess the relative cost-benefit of different metering strategies, IES adopted a Base Case and five variants designed to explore an envelope of possibilities from which a preferred metering strategy could be developed.

The Base Case represented the lowest cost strategy of continuing with use of electromechanical meters (except for multi-phase metering) and using NSLP for settlement of under 160 MWh/year customers. The Base Case was the only scenario that relied solely on NSLP for settlement. Other scenarios assume settlement based on interval-metering where available, else NSLP.

[47] KPMG, p42.
[48] IES, p73

In all except the Base Case, consumers would have the option of voluntarily changing to interval-metering (and associated half-hourly settlements) at no cost to themselves if regarded as advantageous. The scenarios examined by IES were:

(1) **Base Case**: Continued use of electromechanical accumulation meters, except for multi-phase metering, and use of NSLP for settlement of all <160MWh/y customers.

(2) **New and Replacement Only**: Interval meters are installed in new installations or when a customer's existing meter needs to be replaced due to a fault or simply its age. This scenario would see full roll-out of interval meters over a period of approximately 25 years.

(3) **Natural Evolution**: Interval meters are gradually introduced via new and replacement meters and voluntary switching. This scenario would see full roll-out of interval meters over a period of approximately 15 years.

(4) **Forced Evolution**: Interval meters are provided to those whose loads are most likely to respond and for new and replacement meters. This scenario would see full roll-out of interval meters over a period of approximately 10 years.

(5) **2nd Tier With E/M Replacement**: Interval-metering is mandatory for customers changing retailer; otherwise new and replacement meters are electromechanical. This scenario would see roll-out of interval meters for a maximum of only 40% over a period of approximately 25 years.

(6) **2nd Tier With I-M Replacement**: Interval-metering is mandatory for customers changing retailer. Otherwise new and replacement meters are electronic interval. This scenario would see full roll-out of interval meters over a period of approximately 15 years.

4.2 Meter Costs assumed by IES

Although reference is commonly made to "a meter", IES distinguished between four different types of meter depending on their capability and use. These are (with their estimated numbers in the current Victorian meter population of approximately 2m meters):

- Single phase 1,350,000;
- Hot water 450,000;
- Multi-phase 190,000;
- Current transformer (CT) 5,000.

The average costs of meters using the above mix of meters are summarised in Table 6 in the IES report.

Table 3: IES Table 6 – Meter capital costs ($)

	Mechanical (old)	Mechanical (new)	Electronic (2001)	Electronic (post-2005)
Single phase	150	48	120	75
Hot water	250	240	240	150
Multi-phase	400	190	190	120
CT	600	550	550	550
Average	**197**	**106**	**155**	**93**

"Electronic" refers to a manually read electronic interval meter

IES used estimated installation costs provided by the DB Meter Installation Working Group of $40[49] for both electromechanical and electronic meters saying *(t)his cost is applicable to urban areas (covering approximately 90% of customers) and assumes a large volume of installations with little travel time.* This yields an average initial capital cost in the range of $160-$280 cost for single phase interval meters compared to the range of $150-300 accepted by KPMG in the EPD/MIG paper. The lower range of both estimates is for a single tariff, single-phase meter; the upper range of both estimates is for a two-part meter fitted with a switch for controllable (hot water or space heating) load.

IES used a manual meter reading cost ranging from $2.40/y for electromechanical accumulation meters to $2.80/y for electronic interval meters based on advice from the DB Meter Installation Working Group. This compares to a figure of $6/y and $8/y assumed by the NSW Treasury in the figures referred to by KPMG. **No comment or explanation is provided in any of the jurisdictional papers about why meter reading costs in NSW might be 150% higher than in Victoria.**

IES summarised the cumulative metering and settlement costs assumed in the economic analysis in Table 7 of their report. This included estimates of Establishment Costs based on information from PHB Hagler Bailly's report to EPD. [50]

4.3 Interval meter benefits

In addition to unquantified "general" benefits of facilitating and increasing the effects of competition in electricity supply, IES identified two broad classes of benefit that can flow from the ability to measure >160MWh/year customer loads on a half hourly basis. These are:

[49] We note, however, that the SAIIR has reported *The Victorian distribution businesses, for example, suggested that an installation cost of $25 per site would be achieved for a mass roll out of meters.* Information Paper no. 5, Metering: Role of Industry Regulator and Evolving Technologies - Paper Prepared at the Request of the Consumer Advisory Committee, SAIIR, February 2001, p8.

[50] *Introduction Of Full Contestability In Electricity Supply: Review Of Proposals For Metering And Settlement,* PHB-Hagler Bailley report to Victorian EPD, 21 July 1999

- *Direct benefit*s, that largely flow from the ability to encourage changes in load patterns that lead to system cost savings that can be assessed and included in a standard cost/benefit analysis.

IES says that *direct benefits from interval-metering are achieved if, as a result of that metering, loads are modified (by demand response) to the extent that there are identifiable cost savings in generation, transmission and distribution. Peak loads in Victoria (and SA, and increasingly NSW and Queensland) are strongly influenced by the growing summer air-conditioning load. At such times, plant and equipment tends to be most highly utilised. Peak loads tend to drive investments in new peak capacity for generation, transmission and distribution. A consistent reduction in peak load reduces the requirement for peak capacity in peak generation, (assumed to be gas turbines), transmission and distribution.*[51]

IES does, however, note that there is a disconnect between the impact of demand response on energy market costs/savings and network costs/savings - primarily because *pricing of transmission and distribution is not currently integrated with that market* (the NEM). IES also notes *that prices in the energy market are not driven by peak demand, but by the balance between supply and demand. Thus it is entirely possible, and indeed likely, that the peak load in a hot year will achieve only a moderate price in the energy spot market. This would occur if all or most generating plant were available, as is the norm these days. Only if there were co-incident generator outages would prices at times of peak loads become high*. ***If peak loads can pass, on some occasions at least, without a significant price impact on the energy market, then clearly the networks cannot rely on the energy market always to reduce such peak demands.***

It follows from the above argument that network constraints will have to be reflected directly into load management arrangements if network savings are to be achieved in practice.

This is an important point, if somewhat overstated, and goes to the heart of the argument that consumers will be unable to access the full benefits of competition unless there are fundamental changes in network pricing methodologies - and better integration of networks into the energy market. It also touches on another important issue for consumers; generators can manipulate the supply-demand balance whenever supply-side plant or system constraints occur.

IES may be overstating the disconnect between energy market benefits and network benefits, since it is more likely that supply-demand will be tighter when system demand is highest. Indeed, this is the basis (of what Pareto has argued is faulty[52]) logic underpinning the "need" for high energy market Price Caps during periods of high demand to incentivise investment in extreme peak generation plant.

[51] IES, p35

[52] Pareto's criticism of the arguments put by the supply-side and supported by NECA and the ACCC to justify extreme high Price Caps in the NEM is contained in a submission prepared for the Energy Users' Group of Australia. See "*National Electricity Code VoLL Review, Response To Draft Determination, An End-Use Customer Perspective*", August 2000.

- *Indirect benefit*s, not so readily assessable and not able to be included directly in a cost-benefit analysis, but which should be duly noted when drawing conclusions on the study outcome. IES identifies the following as indirect benefits but discounted most as quantifiable benefits in its analysis -

  - Equity Between Customers and between Customers and Retailers; IES says *a key objective of contestability is to improve the distribution of benefits between customers and the supply-side of the market, and is an over-riding consideration* - but appears not to consider this a basis for separately quantifying a benefit to consumers.

  This is an interesting position for IES to have taken in a report for the Victorian DBs. The DBs (and other Host retailers in the NEM) have consistently argued for "appropriate" allocation of wholesale market settlement risks from FRC - to 2nd Tier retailers and their customers. Expressions of concern about these "intra-equity" issues are still being expressed along with warnings (unquantified in the public domain) about the potential for "residual" risk to host retailers from settlements based on NSLP.[53] Yet IES assigned no value to this risk.

  - Risks to Retailers from Loss factor Approximations; IES says - *On balance, we do not see this issue has having a major impact on the current analysis* - and includes no estimate of benefit that interval meters might provide to consumers.
  - Supporting the Working of the Energy Market; IES says - *in an uncertain world such a factor should be taken into account when drawing conclusions* - but includes no estimate of benefit that interval meters might provide to consumers.

  Lack of demand response is a major failing of the NEM (and electricity markets around the world). Price signalling **and response from informed, economically empowered consumers** would vastly improve the "Working of the Energy Market" - and could only be delivered with interval meters (and a convenient and automatic mechanism to activate demand response in time periods matching despatch and settlement in the NEM) but, again, IES assigns no benefit to this. This issue is addressed further in later sections of the report.

  - Information for Network Planning; IES says - *Load data obtained from interval-metering would certainly be useful for network planning, but we see no compelling reason why it should be a dominant consideration in assessing metering strategy*. In effect, IES assigned no benefit from improvements in network planning that might flow from better information about network utilisation that interval meters could provide.

  However, we do note that IES estimates that around 50% of the benefits from interval meters would come from improved efficiency in investment in network assets arising from demand response to price signals during periods of high system load.

[53] We are advised that retailers do attribute a value to this bias and, to the extent that they can, are monitoring the incidence. We are also advised that, it is true that other risks borne by the retailer on behalf of the customer are more significant.

4.3.1 Results of the IES cost-benefit analysis

The results of IES' analysis of costs and benefits for the scenarios assumed are summarised in Table 3 below. This information is consolidated from Tables 7 and 9 of the IES report.

An immediate observation is that in only one scenario (2nd Tier with E/M Replacement) are the estimated costs more than the estimated benefits - and that all other scenarios appear to offer greater benefits to consumers than does the Base Case (continued use of electromechanical meters with NSLP for all small consumers). The greatest net benefit appears to be from the scenario for New and Replacement Only.

Table 4: Estimates of cost and benefit for IES scenarios (NPV - $M)

Scenario	Costs					Benefits
	Estab	Meter	M&S	Total	Over Base	Over Base
Base Case	22	580	145	747	0	0
New and Replacement Only	43	625	157	825	78	141
Natural Evolution	43	659	170	872	125	166
Forced Evolution	43	690	181	914	167	194
2nd Tier With E/M Replacement	43	632	163	838	91	55
2nd Tier With I-M Replacement	43	673	174	890	143	173

Costs annualised at 8.5% over 30 years in Jan 2001 dollars.
M&S = "Other" metering & settlement costs
NPV estimates of cost from IES Table 7
NPV estimates of benefits from IES Table 9

However, IES offers a less sanguine (more conservative) interpretation of the results in saying *(t)he analysis … indicated that:*

- *Under the assumptions made, costs and benefits are of a similar order, with some advantage indicated for the new and replacement interval-metering scenario.*
- *Conclusions on the most appropriate strategy are clouded by the number of interacting factors affecting the outcomes.*[54]

Specifically, IES said that *(k)ey observations on the numerical results are:*

- *New and replacement interval-metering appears to have a clear advantage over other scenarios* (because) *the cost of installation of the meter is not prematurely incurred.*

[54] IES, p61

- *The second-tier scenario with electro- mechanical new and replacement meters incurs costs greater than benefits … because the relative cost-effectiveness of the new and replacement strategies is foregone.*
- *The remaining scenarios (natural evolution, forced evolution and 2nd tier with interval new and replacements) show costs and benefits of a similar order.*
- *Differences between metering scenarios may be more a function of the parameters chosen for the scenario rather than an indication of the relative worth of following each approach. Some observations on this point:*

  - *the assumed cost of interval meters at the start of contestability at $120, with cost reductions to $75 within 5 years,* ***appears aggressive. Such an outcome may be realised, but a strategy based on this assumption could not be regarded as robust.*** (Emphasis added.)

  The information in this report shows conclusively (*with the benefit of just over one year's "development" of the interval meter market*) that IES was being far too cautious. The metering costs IES assumed for 2001 are substantially above prevailing prices (in early 2001) in the local and international meter markets.

  - *Total meter costs are extremely sensitive to the additional time taken to read an interval meter. The additional meter reading cost of 40c/year has a negligible impact on costs. However, if this cost is higher by, say, a factor of 5 (due to longer than assumed download times through the meter's reading port), then the costs of interval-metering will be affected significantly.*

  This is a legitimate concern, but could be overcome by roll-out of a low cost remote reading system similar to that being installed in Italy - a feature that would also be more likely to ensure that consumers gain access to all of the benefits of competition. Not only does ENEL, the Italian company, believe that it will contain costs but that it will be able to recover its $3.3 billion investment in remotely read interval meters in just 4 years through substantial improvement in its distribution and retail business.

  - *While we consider that the benefits assumed are achievable in principle, there can be no great surprise if they fall short or, more likely, are delayed pending much greater penetration of new communication and control technologies and refinements in retailer marketing.*

  This is also a legitimate issue. The IES analysis shows that - even with the conservative estimates of cost and benefits that IES assumed - roll-out of interval meters **delivers a net benefit to small consumers for every scenario IES examined except for compulsory interval metering of 2nd Tier customers with electromechanical replacement for 1st Tier consumers**. We argue later that there are other additional benefits to consumers that interval metering could deliver.

However, a substantial proportion of the benefits to consumers would only be delivered if consumers respond to price signals that interval meters would deliver. This will require (as a minimum):

- an automatic and convenient way for consumers to respond to price signals;
- a willingness on the part of retailers to offer "load management" services to consumers - rather than continued promotion of load growth;
- a willingness of consumers to accept such offers; and (most probably)
- a substantial change in the existing stock of household electrical appliances and equipment - or modifications to household wiring - so that automatic load management is effective.

Most importantly, it will require a fundamental change in consumer expectations about supply reliability and a change in cultural attitudes developed over generations that electricity will always be available at the "flick of a switch" at a "constant" and reasonable price.

- *The timing of assumed meter penetration in relation to the meter cost is a major consideration that affects absolute costs and benefits as well as the relativities between scenarios.*

IES also expressed that view that a *fundamental shortcoming of this scenario analysis is that it almost certainly fails to encompass different scenarios that could demonstrably improve on those currently included.* To address the "*fundamental shortcoming*" of its scenario analysis, IES went on to present the results of a complimentary "*breakeven analysis*" that *might indicate features that would…increase robustness against different meter cost and load response assumptions - in essence, improving the margin of benefits over costs.*[55]

IES summarises the results of its "*breakeven analysis*" by saying that *(k)ey points from the outcomes are:*

- *The interval meter cost that would break even with existing meters regardless of load is essentially the cost of existing meters, with a (currently small) adjustment down to account for the additional reading costs associated with interval meters. This applies only when the current meter is new or needs to be replaced for other reasons. In other cases the breakeven meter cost is less. This breakeven point is of course independent of any assumptions regarding the potential benefits of load response. The point essentially "anchors" the curve where the load is zero.*

This is a cumbersome paragraph and appears to have lead KPMG to an incorrect interpretation of IES' findings when preparing the EPD/MIG paper. In a reference to the point made by IES above, KPMG says *IES concluded that single phase metering costs need to reduce to the current cost of basic accumulation meters*

[55] IES, p59-60

(currently about $45) in order to provide benefits to customers compared with installation of basic accumulation meters.[56]

This is clearly not what IES intended. IES conditions the statement with the words "*regardless of load*". Details of the IES analysis presented in Appendices to its report show clearly that KPMG's interpretation is only correct for consumers with zero load. As shown below, IES concluded that at *expected meter purchase costs, breakeven loads are around 5MWh/year or lower and could justify interval-metering of the larger half of customers or more. However, there are equity considerations with these strategies.*

- *The new strategy* (a "refinement" of IES' initial scenario that considered using interval meters only for new installations, but not replacement) *shows the lowest breakeven load overall, … since the meter is not replaced prematurely ... and because early benefits are likely.*
- *The replacement strategy has an advantage in metering cost over the forced strategy (again, because the meter is not replaced prematurely), and maintains this advantage over all interval meter costs, as the benefits per meter installed in each case are similar.*
- *The second tier strategy is the most difficult to assess, but under our benefits assumptions and analysis, and assuming 15% switching, the breakeven load is broadly similar to the Forced strategy, but with a wide band of uncertainty.*
- *The Voluntary strategy shows a relatively poor breakeven curve because the load response benefits are assumed to be dissipated by interval-metering being focussed on loads that are already low cost and probably inelastic.*

As would be expected, the new and replacement strategies perform best in direct benefit terms. At expected meter purchase costs, breakeven loads are around 5MWh/year or lower and could justify interval-metering of the larger half of customers or more. However, there are equity considerations with these strategies.[57]

4.3.2 Conclusions and recommendations made by IES

The conclusions that IES presented can be summarised as:

- *attention should focus on the 10-20% of customers with highest consumption to -*
  - *deliver the most rapid benefit form a (manually read) interval meter roll-out;*
  - *(probably) achieve reasonable meter scale economies (although this could change with co-operation between jurisdictions).*

[56] KPMG, p42
[57] IES, p73-74

- *voluntary and second-tier strategies would hinder development of competition by focussing retailer attention on attacking and defending the low cost customer base rather than on competing by minimising the cost of supply.*
- *the breakeven analysis show a particular advantage for the new and, to a lesser extent, replacement strategies, largely because meters are not prematurely replaced. However, **at interval meter costs expected to prevail at the start of contestability**, the breakeven loads under the new strategy would cover only 50% of customers, and less with a pessimistic view of load response outcomes.*
- *an interval-metering strategy focussing on the 10-20% of customers with the highest annual consumption (around 50% of energy consumption of the tranche in total) should be pursued. **Naturally, the extent of interval metering, if any should be subject to meter costs being within the bounds assumed in this report.***
- *the timing and nature of the strategy to be followed for the remainder will depend on experience with meter costs and assessments of load responses, and also on developments in metering and communications as well as competitive outcomes in this part of the contestable market.*

Recommendations that IES made can be summarised as:

1. *Switching retailers should not be contingent on being interval-metered.*

2. *Interval-metering should focus initially on the largest 10-20% of customers - and all >160MWh/year customers who are not currently interval-metered.*

3. *Remaining customers should be settled using NSLP.*

4. *Interval-metering and half-hourly settlement should be extended to new and replacement meters - based on a breakeven calculation using recent experience with interval meter costs.*

5. *If the issue of equity of treatment is considered by ORG to be significant, then half-hourly settlement should be divorced from the interval-metering strategy - that will be substantially driven by experience with interval-metering costs.*

6. *It would appear most equitable to smear the cost of interval-metering among the size class that is being interval-metered.*

7. *Interval metering beyond the largest 10-20% of customers should take account of the need to maximise the opportunities for innovation and customer choice, as well as experience with metering costs and the achievement of benefits.*

8. *Wholesale energy purchases for customers with second circuits should be settled (with NSLP) recognising the off-peak nature of the supply to this circuit.*

9. *The basic meter specification currently in draft form should be reviewed to ensure that it does not hinder innovation and competition.*

10. *Regulatory policy should take account of the fact that around half of the potential benefits of this study are derived from improvements in network utilisation. If these benefits are to be realised in practice, then the regulation of network pricing must support pro-active and dynamic management of loads on the network in support of that goal.*

4.4 Areas where the IES analysis might be improved

The IES report attempts to quantify costs and benefits of a range of metering/profiling scenarios for FRC and contains a useful cost-benefit analysis of and commentary on profiling and metering options.

Despite the quality of this report it appears to have been referenced (selectively and in some cases inaccurately) but otherwise largely ignored by the jurisdictions. It is not clear why this is so, but it appears to be unrelated to any of, what we believe are, its shortcomings. Areas where we believe the IES analysis could be improved and used as a better, more current, contribution to the policy discussion are:

- The analysis of costs and benefits is confined to Victoria - when costs, particularly estimates of stranded costs of existing metering stocks may be different in other jurisdictions.

  For example, we are advised that the average age of existing metering stock is around 30 years for Victoria, 20 years for NSW and 10 years for QLD.[58]

  The implications of this difference in asset age profile on meter replacement strategies will depend to some extent on asset valuation policies adopted by various jurisdictions. It would be logical for jurisdictional regulators to be consistent and assign values to existing metering assets using Depreciated Optimised Replacement Cost methodologies. This is, fundamentally, the approach adopted by the jurisdictions in initial regulatory valuation of network assets.

  The replacement cost of new meters is well below historical costs (e.g. Table 6 of the IES report shows cost comparisons for "old" and "new" meters with the costs for electro-mechanical meters being $150 and $48 respectively). That means that the "optimised" value of existing electromechanical meters should be no more than the $48 of **a new electromechanical meter.** Therefore application of a DORC methodology should result in substantial write down in the historical book value of existing meter assets in all jurisdictions.

[58] This information was provided by Email meters and independently confirmed as reasonable by Prof Hugh Outhred of the University of NSW.

If it is assumed that electromechanical accumulation meters have an economic life of 40 years, then it appears that the total DORC value of small consumer meter assets in Victoria, NSW and Queensland might be only around $25 million, $65 million and $50 million respectively. These are large numbers, but they pale into insignificance compared to the likely cost of implementing FRC that some consumer representatives suggest might run into billions of dollars. They are also very much smaller than the value small consumers could contribute towards reducing the cost on energy during periods of supply constraint - if they responded to wholesale market price signals (see below).

- The costs assumed by IES for interval meters, though roughly consistent with costs reported in jurisdictional policy papers, are conservatively high compared to costs that can actually be achieved in Australia now, even for small order volumes. The interval meter costs assumed by IES are also very substantially above unit costs expected to be achieved in the large-scale interval meter roll-out in Italy.

  For example, Table 6 of the IES report shows single-phase electronic interval meters varying in cost from $120 in 2001 to $75 in 2005; and switchable, electronic interval meters for controlled loads (i.e. hot water or space heating) varying in cost from $240 in 2001 to $150 in 2005. These types of meters are available now in Australia in small order quantities for prices around $100 and $170 respectively. Sophisticated, communication ready interval meters for ENEL's large-scale roll-out in Italy are expected to cost less than $65/unit.

- No analysis was conducted of remotely-read interval meter options - on the assumption that current remote reading costs, which are prohibitive for small consumers, could not be reduced sufficiently to make this a feasible economic option.

  The average total investment cost of ENEL SpA's remotely read interval meter roll-out is expected to cost around $110/metering point, and to deliver substantial savings to ENEL's distribution and retail business with a pay-back in four years. There may be differences in technical characteristics between distribution systems in the NEM and Italy, but the magnitude of the benefits suggested by ENEL provides a strong *prima facie* case for a detailed examination of this option for the NEM.

- The benefit that demand side response can have in moderating the abuse of economic power by generators in the wholesale market is ignored. This is a potentially important, but complex, issue for the NEM - particularly the Victorian and SA Regions in the short term - and is discussed further in later sections of the report.

- Allowing consumers access to load management technologies that could be used to reduce total energy consumption.

In the discussion of load management options IES does, however, note that load reduction is possible (for example, through "Smart House" technology in the residential sector) but is *hindered presently by general acceptance of standards and, perhaps more importantly,*

a compelling reason for mass deployment. IES also notes that however, *in future one such reason may emerge from public policy dealing with the greenhouse issue*.[59]

There is a frustrating element of circulatory and policy dependency (by the electricity industry) demonstrated in the IES argument. The Italian interval meter roll-out provides a graphic illustration of what is possible from low-cost, sophisticated interval metering technology. This is occurring because one company has adopted (in fact pioneered the development of) one particular *standard* and used the opportunity for significant improvement in business performance as the *compelling reason for mass deployment*.

IES appears to be suggesting that a change in government policy is necessary to provide the *compelling reason for mass deployment* in the NEM (or at least Victoria). Given that -- **even with what we demonstrate are conservative (i.e. far too high) cost assumptions, and with what we argue are conservative (i.e too low) estimates of benefit** - the IES analysis demonstrates that consumers would be better off if there was a large-scale roll-out of interval meters, we suggest that there are other ways of creating "compulsion" for the electricity industry (and jurisdictional regulators) to act. That is for the ACCC to reinstate a "Sunset Clause" in its determination on Code changes for FRC that:

- prohibits further installation of accumulation meters from 1 January 2002; and
- requires roll-out of interval meters to all consumers within 10 years (at the latest).

4.5 Cost-benefit and Public Benefit

The numerous consultants' reports[60] to (or provided to) jurisdictional regulators and policy makers all make a "good fist" of identifying the many benefits to distributors, retailers and consumers that remotely-read interval meters could provide.

On the other hand, all of the consultants' reports except that prepared by IES for the Victorian DBs over-emphasise the benefits that load profiling delivers to consumers. Or perhaps it is more appropriate to say that these consultants' reports fail to assign any quantitative value to the potential benefits that consumers might realise, and emphasise only that the initial cost of load profiling is less than interval metering.

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[59] IES, p47

[60] *Development of a Conceptual Metering and Settlement Design for Full Retail Competition in the National Electricity Market*, PHB-Lacuna report to NEMMCO, 11 December 1998, URL: http://www.nemmco.com.au/future/retail/838.htm

Contestability For Residential and Other Low Use Electricity Customers, SRC International report to IPART, December 1998, URL: http://www.ipart.nsw.gov.au/ (Reports-Electricity-RP12)

Introduction Of Full Contestability In Electricity Supply: Review Of Proposals For Metering And Settlement, PHB-Hagler Bailley report to Victorian EPD, 21 July 1999, URL: http://www.nemmco.com.au/future/retail/709-0013.htm

Review of the Victorian Distribution Businesses' Preferred Trading Arrangements:, Ernst & Young report to Victorian Department of Treasury & Finance, July 1999, URL: http://www.nemmco.com.au/future/retail/709-0010.htm

Evaluation of Metering Strategies for Full Retail Contestability, Intelligent Energy Systems report to Victorian Distribution Businesses, December 1999, URL: *http://www.nemmco.com.au/future/retail/1336.htm*

Load profiling has only one benefit, its lower initial cost. Load profiling delivers no other benefit *per se* to consumers as a group or individually - **unless that consumer is the beneficiary of economically inefficient and inequitable cross subsidies in the energy component of retail Tariffs**. Indeed, load profiling entrenches economic inefficiencies and inequities that **ensure** consumers cannot access the majority of the benefits that competition might deliver.

The IES report is the only one that attempts to present a competent, professional and quantified estimate of the cost and benefit to consumers for a range of five options for load profiling and interval metering. The options range from scenarios assuming:

- universal load profiling with no interval meter roll-out; to
- "forced" replacement of all existing basic accumulation meters over the period to 2010; which requires to "write-off" of "stranded costs" for existing, serviceable accumulation meters.

It is disturbing that the IES report has not received more attention from regulators and policy makers. This lack of attention does not seem to relate to what we believe are flaws in the report which include:

- the cost-benefit analyses cover only Victoria, and not other Regions of the NEM;
- the costs assumed by IES for interval meters, roughly consistent with costs reported in jurisdictional policy papers, are conservatively high compared to costs indicated in the actual roll-outs described in our report - **and costs currently being offered by meter suppliers for small volume orders of interval meters**;
- it only assesses options for roll-out of manually read interval meters;
- benefit that demand side response can have in moderating the abuse of economic power by generators in the wholesale market is ignored; and
- no allowance has been made for the benefit to consumers of access to load management technologies that could be used to reduce total energy consumption.

IES' general conclusion was that *"the costs and benefits of these scenarios are of a similar order. Some advantage could be discerned with strategies involving new and replacement meters, largely because there is no cost associated with the premature retirement of existing meters. However, given the uncertainty surrounding whether the assumed costs and benefits can be achieved, we conclude that the robustness of the strategies against such changes should be improved if possible. The way to do this would be to target customers most likely to deliver the greatest margin of benefits over costs. These will tend to be those customers with the largest annual consumption."*[61]

[61] IES report, p(ii)

More specifically, IES concluded *"although costs and benefits remain uncertain at this stage, an interval-metering strategy focussing on the 10-20% of customers with the highest annual consumption (around 50% of energy consumption of the tranche in total) should be pursued. Naturally, the extent of interval metering, if any should be subject to meter costs being within the bounds assumed in this report."*[62]

We argue that, if the IES analysis was repeated using the costs **and** the same - more liberal - interpretation of realisable benefits that regulators and company executives have used in the cases we present in this report, the conclusion would be that **roll-out of interval meters to the timetable of the IES "forced" strategy (or quicker) was justified.**

[62] *Op Cit*, p(iv)

5 INTERVAL METERING ROLL-OUTS

A key part of our scope of work was to obtain information on actual costs incurred in execution of large-scale interval meter roll-outs in the few jurisdictions in North America and Italy were roll-outs were known to be underway. The two specific roll-outs that were targeted were those undertaken by:

- Wisconsin Public Service in the US; and
- ENEL SpA in Italy.

Language and communication difficulties (and lack of adequate resources) prevented us from obtaining any details of the third large-scale interval meter roll-out in Puerto Rico, although we have confirmed with the supplier of the powerline carrier and meter reading system that the roll-out is underway. The Puerto Rico roll-out is using exactly the same technology as that adopted in Wisconsin.

A fourth case, that of IPALCO's subsidiary, Indiana Power & Light (IPL), the electric utility serving Indianapolis, Indiana was also examined. IPALCO has completed a two year program to install over 420,000 AMR (Advanced Meter Reading) meters for virtually all of its residential customers - save the most remote. The technology used is a retrofit of traditional electromechanical meters. These are self-reading, radio-equipped meters that use a proprietary cell phone and infrastructure technology offered by CellNet to read the meters. This set-up can only be used in densely populated areas as the signal from the meter carries only 0.4km. An amplifier can pick up the signal and send it another 8km, with this repeating until the signal is carried to the central system.[63] Currently IPALCO only has one-way communication from the meter - which eliminates that possibility for automatic turn-on/off or check for outages etc - and only collects data only once per day. However, IPALCO but may move to interval (every 15 minutes) metering for demand customers at some point,[64] but this is only being considered for their largest customers. Unfortunately, the terms of the arrangement between IPALCO and CellNet is considered proprietary. Neither the utility nor the regulatory body in Indiana was prepared to provide details of costs or the regulatory approval process.

The remainder of this section focuses on the Wisconsin and Italian roll-outs. A brief summary is also provided of the proposal by San Diego Gas & Electric to commence rollout of interval meters. At the time of writing (March 2001), the California Public Utilities Commission had granted approval for SG&E's proposal for roll-out to >100kW customers.

[63] The same CellNet systems have been installed in Kansas City and St. Louis.

[64] Peter Koers, Supervisor of Meter Services, IPALCO

Additional background and other material relevant to the US experience is contained in Appendix B. An outline of the legal and regulatory arrangements in the European Union, under which the Italian roll-out is occurring is contained in Appendix C.

5.1 The US Experience[65]

While many electricity markets in the US are in the process of opening to retail competition for small consumers, there has been relatively little attention paid to considerations of advanced metering for small residential and commercial customers, or of more sophisticated load profiling for such customer classes. The default system in all but a few jurisdictions and utility service territories has been accumulation metering integrated with static load profiling, irrespective of whether these markets and service territories are currently regulated or deregulated. Where issues of metering options for small customers have been considered by regulators in jurisdictions undergoing restructuring, they have, on the whole, focussed on allowing competition in metering services, rather than installation of more advanced metering by distribution utilities on a service territory basis.

This situation is beginning to change. The failure of any real market for competitive metering to emerge in deregulated jurisdictions, along with the failure of any real competitive market for energy services in general, has caused some regulators to begin reconsideration of the delivery of metering services by distribution utilities for smaller customers. More significantly, the enormous distortions of the wholesale electric power market in California and other jurisdictions have accelerated calls for systems that would both incentivise and allow demand response by customers through interval metering, and time of use and real time pricing. Section 5.1.1 of this report[66] summarises these policy deliberations as they have been, and are currently, evolving.

While policy is lagging, technology is rapidly advancing. Metering and communication system manufacturers have developed robust and flexible systems that can be implemented on utility wide basis to provide cost-effective metering and data management.

A few utilities, with the approval of regulatory bodies, are initiating plans to re-meter their entire service territories. One, Wisconsin Public Service Corporation, which operates in a still regulated environment, sees benefit in cutting its operating costs and in developing infrastructure that it can market to other utilities contiguous to its service territory. The other, San Diego Gas and Electric, which operates in a very volatile deregulated market, hopes to provide a framework for Real Time Pricing that will provide customer value, incentivise demand response to price signals, and moderate wholesale price increases. This report

[65] This summary of experiences in the US' was prepared by Chris Deisinger and Janice Anderson of MSB Energy Associates, Inc.

[66] Findings on the costs of interval metering from two publicly available reports are also summarised in Appendix B. "*A White Paper on Direct Access Metering and Data Communication Requirements*" was produced by Plexus Research for the National Association of Regulatory Utility Commissioners (NARUC) in March of 1998 and "*Cost Impact of Competitive and Network Metering in New York State*" was produced by Arthur Anderson for the New York Department of Public Service in December 1998.

contains data on costs obtained, in the detail available, from these two projects in Sections 5.1.2 and 5.1.3.

In addition, it has been suggested that a more sophisticated system of load profiling may provide some of the benefits of interval metering for purposes of settlement, allocative fairness and incentivise demand response. This report will not deal with the question of whether or to what extent that is true, but it does, for purposes of cost comparison, provide the available detail in Section 5.1.4 on the use of dynamic load profiling by the largest California utility, Pacific Gas and Electric Corporation (PG&E).

5.1.1 Regulatory developments in the US

To date in the US, there has been almost no implementation of interval metering or Time of Use (also called Real Time Electric) Rates for smaller customers. While discussed from time to time, particularly at times of constrained supplies or high prices such as in the 1970s, policies promoting these developments have not been pushed by regulators because:

- of lack of metering infrastructure;
- of the perception there would be a stakeholder backlash to disaggregated rates; and
- market imbalances were eventually resolved under a regulated structure.[67]

Utilities facing deregulation and divestment in more recent times have sought, with the support of regulators, not to make capital investments in general, let alone in systems that may be subject to disputes about stranded cost recovery or may be been seen as pre-empting resolution of policies affecting delivery of competitive services.

As discussion of electric market deregulation advanced in various jurisdictions, three general options were considered for development of rates and settlement systems for smaller customer classes:

- global roll-outs of interval metering by distribution utilities,
- load profiling systems, and
- opening up metering services to competition with dependence on load profiling for remaining customers.

Discussion of global interval metering has not been considered very seriously, or studied extensively by any jurisdiction, for the reasons outlined above. In addition, it was widely expected that deregulation would provide increased supply and put downward pressure on prices which would reduce, rather than increase, concerns about demand response and cost-shifting. Moreover, regulatory commissions often expressed the opinion that *anything that*

67 Conversation with Bob Grunaire of the National Regulatory Research Institute.

can be made competitive (such as metering services), should be in order to provide a larger playing field for Energy Service Companies.[68]

While competitive metering was allowed, utilities were required to determine load profiles for customer classes. In effect, these load profiles are static profiles, historically prepared for cost-of-service studies in rate case deliberations, which are modified by weather and seasonal variables to provide estimates. Use of static profiles - sometimes misnamed 'dynamic' if software is used to model weather and seasonal variations - is ubiquitous in the deregulated US markets as is, apparently, the adaptation of embedded cost-of service data for these profiles.[69] The one exception is California where the California Public Utilities Commission (CPUC) mandated that the utilities develop a system of true dynamic load profiles that require daily sampling of selected representatives of customer classes and the overnight posting of those profiles on a web page.[70]

Due to the extraordinary wholesale electric price increases in California and other US markets, there are now signs that the reliance on load profiling and competitive metering is being reconsidered, with particular attention being paid to the prospect that incentivised demand elasticity could offset market power and wholesale price peaks. Moreover, a market in competitive supply of metering services to small customers has not appeared in any jurisdiction, partly due to the failure of retail markets for small customers as a whole, but also due to the high cost per customer for "surgical" interval meter installations as compared to any conceivable individual customer benefit.

For example, the representative of the New York Department of Public Service stated that its presumption against global roll-outs *may be worth re-examining in the light of the current high price volatility. At the time an initial decision was made to adopt load profiling, the markets looked very different*.[71]

The State of Virginia, as another example, initiated discussion in late 2000 about competitive metering and billing services with a Draft Plan[72] which advocated that Electric Service Providers offer competitive metering. After further consideration, the Commission recommended to the legislature that no pre-emptive decision on competitive metering be made pending further study due to the fact that there were simply no successful competitive metering markets that had been developed, and that incumbent utilities seemed to enjoy significant economies of scale regarding metering services.[73] In comments to the Commission, the staff report recognises the inherent weakness of load profiling in providing time sensitive

68 Such logic informed the New York state Department of Public Service's decision not to mandate utility roll-outs of interval metering, for example, but instead to allow provision of competitive metering. It was decided, given the market conditions at the time, that interval metering of small customers was not cost-effective compared with the benefits. Source: Marty Insogna, New York Department of Public Service.

69 Comments of Marty Insogna, New York Department of Public Service, who notes that the utilities' load profiling varies greatly in quality and in customer class determination.

70 For example, see Pacific Gas & Electric at URL http://www.pge.com/006_news/006f1c4a1_instruction.shtml

71 Comments of Marty Insogna

72 http://www.state.va.us/scc/caseinfo/orders/e000346.htm

73 http://www.state.va.us/scc/caseinfo/orders/case/mbplan_e000346.pdf

price signals and, conversely, the ability of advanced metering to produce individual savings and global benefits by reducing total market demand during peak and thus average prices.[74]

This last point has been amplified in recent studies done in response to the extreme price shocks in wholesale markets in the US. Dr. Ahmad Faruqui of the Electric Power Research Institute (EPRI) has conducted a study on the effect that Real Time Pricing might have had in moderating the increase of wholesale prices in California over this last summer. He concludes that demand would have been lowered by 2.5% and wholesale prices by 24% over the period of May through August and that over the entire summer this would have meant a reduction of 12% for a reduction in costs to consumers of $700 million.[75]

While this is an anecdotal account of regulatory reconsiderations in light of the performance of wholesale markets, it can be stated with assurance that such reconsideration is taking place and that the issue of incentivising demand response for small customers, and its link with more advanced metering, is on the table. This is particularly true in California, where one utility has sought approval for re-metering its entire service territory with an advanced system that will support Real Time Metering. That proposal is discussed below.

5.1.2 Implementation of interval metering - Wisconsin Public Service Corporation

The only large-scale roll-out of a service territory-wide metering system in the continental US[76] capable of recording and manipulating interval meter data is that of the Wisconsin Public Service Corporation (WPSC). WPSC is a regulated, investor-owned utility in the state of Wisconsin with approximately 425,000 electric and gas customers (with 388,451 electric meters and 229,905 gas meters reported in 2000). Wisconsin has not yet deregulated its electric utility structure and investments and their recovery in rates by the utilities remains under the jurisdiction of the Public Service Commission of Wisconsin (PSCoW).

System Description

WPSC is in the process of installing a system known as the Two Way Automatic Control System (TWACS) manufactured and marketed by Distribution Control Systems Inc (DCSI).[77] The TWACS integrated metering transponder can be retrofitted on many existing electromechanical or solid state accumulation meters and relies on power-line communications. Each substation requires communication equipment and a net server is housed at a central point for system management and data collection. Meters of different utility types (electric, gas, water) can be linked at individual customer sites to provide

74 http://www.state.va.us/scc/caseinfo/orders/case/e000346stf.pdf

75 A summary of the report is at http://www.epri.com/highlights.asp?objid=246381. Dr. Severin Borenstein of the University of California Energy Institute has also published extensively on this issue. See: "The Trouble with Electricity Markets (and some solutions)" at http://www.ucei.berkeley.edu/ucei/PDF/pwp081.pdf

76 The Puerto Rico Electric Power Authority is in the process of installing a similar system to that of WPS on the entire island of Puerto Rico, a Commonwealth status territory of the US. Attempts to obtain detailed information from PREPA have run in to cost and language barriers. Several smaller entities, specifically rural electric cooperatives, in the US are also employing similar technologies. http://www.twacs.com/news.htm

77 The TWACS system is described on the DCSI website at http://www.twacs.com

aggregated telemetry, as is being done by WPSC. WPSC has been able to retrofit about 65% of the existing meter stock with TWACS modules and is replacing the rest.

The system will support the reading and communication of hourly use data. It sends data, normally, at 8 hour intervals but, because it is a two-way system, can provide on-request real time metering in response to inquires. The system can also integrate load-control transponders and can provide outage notification service, tamper detection and demand billing.

One advantage of the TWACS system is that customer density is not normally a consideration, since it relies for communication on the existing powerline network. The rural/urban diversity of the WPSC service territory made this versatility an attractive feature for WPSC.

Regulatory Considerations and Approval

The PSCoW gave initial approval to WPSC to conduct a pilot program in 1998 that would re-meter 20% of its service territory with an hourly interval capable automatic meter reading system in select rural and urban communities. In those deliberations, WPSC conducted a cost-benefit analysis which determined that the rural portion of the pilot program would have a net even or somewhat positive cost-benefit ratio and that the urban portion would have a negative cost-benefit ratio but that there were currently unquantifiable benefits which justified approval of the pilot. Subsequently WPSC decided to install a single technology - the TWACS system throughout all areas chosen for the pilot.

As of April 19, 2000, WPSC had completed installation of the system in 4 of the 6 planned areas chosen for the pilot, or Phase I of the installation as it was referred to by the utility, and delivered a report to the PSCoW. WPSC applied to the PSCoW for approval of a rate increase for year 2001 and subsequent years that, in part, would provide approval and cost-recovery for expansion of the TWACS system to cover its entire service territory. WPSC was asked to provide a cost-benefit analysis and other justifications, including an outline of unquantifiable benefits, to support its request. The PSCoW approved the request while noting:

> *"The expansion of the AMR program is not cost justified solely on the basis of direct cost savings. WPSC contended that direct savings and indirect benefits will provide benefits to core utility customers beyond the cost to implement AMR. .WPSC contended that it provided support for expansion of the AMR program by showing quantitative and qualitative benefits of system-wide AMR including its ability to provide supplier choice to smaller natural gas customers."*[78]

Quantifiable Costs and Benefits

Information from submissions by WPSC to the PSCoW were used to analyse cost components and benefits, chiefly in Operating and Maintenance savings from reduction in

78 Application by Wisconsin Public Service Corporation for Approval to Increase Electric Rates and Natural Gas Rates, Final Decision. Docket 6690-UR-112. p.19. http://www.psc.state.wi.us/pdffiles/ord_notc/2831.pdf

meter reading costs. This material reviewed included the "*Construction Forecast Update*" and the "*Analysis of Revenue Requirement Impact of 100% AMR for Entire Service Territory*."

The total capital cost projected for this system is US$84.8 million. Of that US$51.8 million is for electric meter devices, US$22.8 million for gas meter devices, US$6.0 million for substation data collection and communication links, US$2.8 million for central station hardware, project management and links to the substation, and US$1.4 million for software. Costs for Operation and Maintenance are not reported explicitly in the material reviewed but are reported as projections of O&M savings. In the first full year of territory-wide system operation, 2003, these are projected to be $3.9 million.

Given the reported numbers of electric meters, gas meters and overall customers in the WPS service territory, the average costs for meter devices (meters and communication module retrofits) alone can be estimated to be:

Electric Meter Devices (388,451)	US$133.43
Gas Meter Devices (229,905)	US$99.10
Per Customer (425,000) Cost of Metering Devices	US$199.57

If the cost of gas meter devices is omitted from the analysis, on the conservative assumption that most of the system components and cost would be necessary for servicing a network of electric meters alone, the capital cost per electric customer is estimated to be US$159.70. Over 15 years, using a 15% cost recovery factor, this amounts to a cost of US$23.95 per year, or US$2.00 per month, per electric customer.

The operating cost savings reported amount to a savings of US$6.35 per meter (electric and gas) per year (or US$9.23 per customer per year). Factoring in the per meter savings to the estimated annual cost per electric customer lowers the annual cost per electric customer to US$17.61 per year, or US$1.47 per month for all-in costs, again using assumptions that are meant to be conservative. In summary:

Average cost of electric meter and module	US$133.43
Average all-in cost per electric meter	US$159.70
Annual cost (over 15 years)/customer	US$23.95
Monthly cost/customer	US$2.00
Monthly cost w/ O&M savings	US$1.47

Non-quantifiable benefits

In the course of deliberations over the WPSC rate-increase request and approval process for the implementation of system-wide advanced metering, the PSCoW staff asked WPSC to explain any intangible benefits to having all customers on automatic meter reading. In response, WPSC identified two major categories of intangible benefits, neither of which were incorporated as savings in filed revenue requirements: Monetary and System Benefits and Improved Customer Service.

Monetary and System Benefits included:

- Potential reduction in office process support
- Reduction in off-hours calls for service outages
- Reduction in meter inventory and limited types of meters
- Reduction in uncollectibles/write offs
- Reduction in estimated bill costs
- Reduction in line loss
- Asset optimisation

Improved Customer Service included:

- Electrical safety increased
- Reduction in outage duration
- Ability to create new innovative pricing programs
- Improved unbilled revenue estimates
- Development of infrastructure that will allow customer choice
- System inspection during installation
- Positive environmental effect due to reduction in vehicle usage
- Improvement of meter accuracy
- Improved load shedding capabilities
- Reduction in energy theft
- Improvement in cash flow
- Reduced meter cost for Demand and Time of Use capability
- Reduction in service visits to customers due to power problems

5.1.3 Implementation of interval metering - San Diego Gas and Electric Real Time Metering Proposal

In July, 2000, San Diego Gas and Electric (SDG&E) applied to the California Public Service Commission (CPUC) for authority to provide all of its customers with Real Time Energy Meters that would be capable of providing customers with hourly consumption information with the intention, according to SDG&E, of empowering customers to control their energy bills by reducing usage during times of peak prices. In Phase I of the plan, SDG&E sought approval to install 22,000 meters for customers with over 20kw of load at an approximate cost of US$25 million.[79] Subsequently, through a collaborative process involving the CPUC and the utility, the Phase I proposal was modified to include the 4,600 to 4,800 largest SDG&E customers at a cost of US$12 million. Commission approval is still in the draft stage, with choice of particular technology options and vendors pending the solicitation of competitive bids in response standards and specifications determined by the utility. Commission staff indicated that they favoured approval of Phase II, which would entail the completion of a Real Time metering system for all customers, but were concerned about issues of cost allocation between customer classes.[80]

While such a plan obviously frontloads capital costs for such a metering system, the cost of such a system seems high, on the order of US$2,200 per customer for capital costs, with a life-cycle cost, according to CPUC sources, of US$5-US$10 per customer per month depending on the resolution of cost allocation issues. The system will apparently be designed to be able to be programmed for measurement of any interval, with 15 minutes being standard, and be adaptable to "piggybacking" for other metering, billing and energy service providers. There is a clear element of "gold-plating" in this proposal compared to that approved by PSCoW.

5.1.4 Dynamic load profiling

As previously noted, all US jurisdictions where retail electric markets have opened have opted for systems of customer classification and static load profiling as the basis of settlements. These static profiles are often merely modifications of information used for historic cost of service studies and therefore have little incremental cost for the utilities and system managers.

The one exception is the market in California, where the CPUC has mandated that the investor-owned utilities develop a system of dynamic load profiling involving metering samples of customer classes and providing daily information for settlements. Information on

[79] In the Matter of the Application of San Diego Gas and Electric Company for Authority to Provide Customers with Real-Time Energy Meters. Application 00-07-055 at: http://www.cpuc.ca.gov/PUBLISHED/RULINGS/3674.htm.
The SDG&E proposal is also discussed in "Rising Power Prices: The Meter Industry's Big Break?" by Bruce Radford in Public Utilities Fortnightly, October 1, 2000, p. 26.

[80] Conversations with Marshall Enderby, CPUC Office of Ratepayer Advocates, 2/6/01 and Anthony Mazy CPUC Office of Ratepayer Advocates, 2/7/01

the costs of the profiling system at Pacific Gas and Electric (PG&E) was obtained from staff at the CPUC.[81]

PG&E provides profiles for two residential, four commercial and five large commercial and industrial rate classes.[82] The utility has approximately 4 million residential customers and 500,000 non-residential. There are 4,000 to 5,000 sample points, but only 1,000 are required for the residential rate classes. Total yearly costs for amortized infrastructure, communications, software licensing and operations are reported as in the range of US$2 to US$3 million per year. Of this US$1 million is reported as required for communication costs alone.

Given this reported cost range, the dynamic load profiling system at PG&E has a per customer cost of between US$0.44 and US$0.67 per year.

5.1.5 Summary

There is a paucity of actual examples of interval metering for small customers or the use of dynamic load profiling in the US. What examples do exist, along with information from available studies, is summarised below.

Meter Systems Type	Utility Implementation or Source	Cost per customer		Monthly cost	
		Installation	Initial system	Operating	All-in per customer
Hourly interval meter, fixed radio frequency provided to all customers	Arthur Anderson report for New York Dept. of Public Service	$56 - 81			$2.50
Competitive metering, hourly interval shared phone-line	Arthur Anderson report for New York Dept. of Public Service	$95 - 120			$21.66
Hourly interval metering, various technologies	NARUC White Paper		$100	$1 - $2	
Hourly interval metering, powerline communication (TWACS)	Wisconsin Public Service	$133	$160		$1.47
"Real-Time Metering"	San Diego Gas & Electric		$1,100 - $2,200		$5 - 10
Dynamic Load Profiling					
	NARUC White Paper		$23	$1.10 - 2.20	
	Pacific Gas & Electric				$0.04 - 0.06

Note: All costs shown in $US.

[81] e-mail message from Marshall Enderby CPUC Office of Ratepayer Advocates 2/7/01, based on his conversation with Susan McNicoll of PG&E

[82] Information on load profiling as it relates to customer classes is available on PG&E's website at: http://www.pge.com/006_news/006f1c4_class_load_prof.shtml

5.2 The Italian Experience - a 2nd Renaissance?

Unlike the US, where public domain information is available from regulatory and government agencies about the activities of regulated (and market-based) entities, there is relatively little public domain information available with details of the Italian interval meter roll-out.

The description of the large-scale interval meter roll-out underway in Italy contained in this section of the report relies almost entirely on public domain information.[83] However, to ensure that the information presented was accurate, and to obtain as much detail as possible on costs and benefits from this roll-out an approach was made to ENEL Distribuzione SpA[84] a wholly owned subsidiary of ENEL SpA. Alberto Perego, ENEL's executive manager with direct responsibility for the interval metering project, provided some additional details to Pareto under the terms and conditions of a Confidentiality Agreement. This section includes just sufficient of that information to confirm the total and average cost of the roll-out.

Pareto has strongly encouraged ENEL and its major equipment suppliers Echelon Corporation[85] (in the US) and Ampy Automation Digilog Limited[86] (in the UK) to release as much information about this project as possible. As will be seen by the material presented in this section, the project represents a major innovation in the global electricity industry. At the completion of the project in 2004, every consumer in Italy will have a remotely read interval meter installed, and Italy will have the most sophisticated metering and two-way communication system in the world embedded into its distribution network.

The anticipated and potential benefits of this system are enormous. A similar roll-out in Australia would allow every electricity consumer in the NEM to gain access to all of the benefits that competition in the electricity industry could deliver. In addition, it would allow electricity retailers and distributors to provide a (limited) range of services to consumers currently provided by telecommunications carriers and provide access to a whole range of services not currently possible.

5.2.1 Liberalisation of the Italian electricity market[87]

Roll-out of interval meters in Italy is occurring during a period of deregulation or liberalisation of the electricity market. As shown in Figure 3 below, Italy produces about 250GWh/y of electricity and imports another 35GWh from neighbouring Member States of the European Union. This compares to production of around 175GWh/y in the NEM.

[83] *Utility Value Enhancement through a new remote Customer Management System ENEL Case*, Alberto Perego, Director of DCE-Rome for ENEL, 18 October 2000, (http://www.lonworld2000.com/). Also a background document to a Media Release from Echelon Corp dated 30 June 2000 (http://www.echelon.com/Company/press/2000/enelJuneMediaAlert.htm)

[84] http://www.enel.it/it/distribuzione/html/default.htm

[85] http://www.echelon.com

[86] http://www.ampy.co.uk

[87] http://europa.eu.int/en/comm/dg17/elec/implit00.pdf

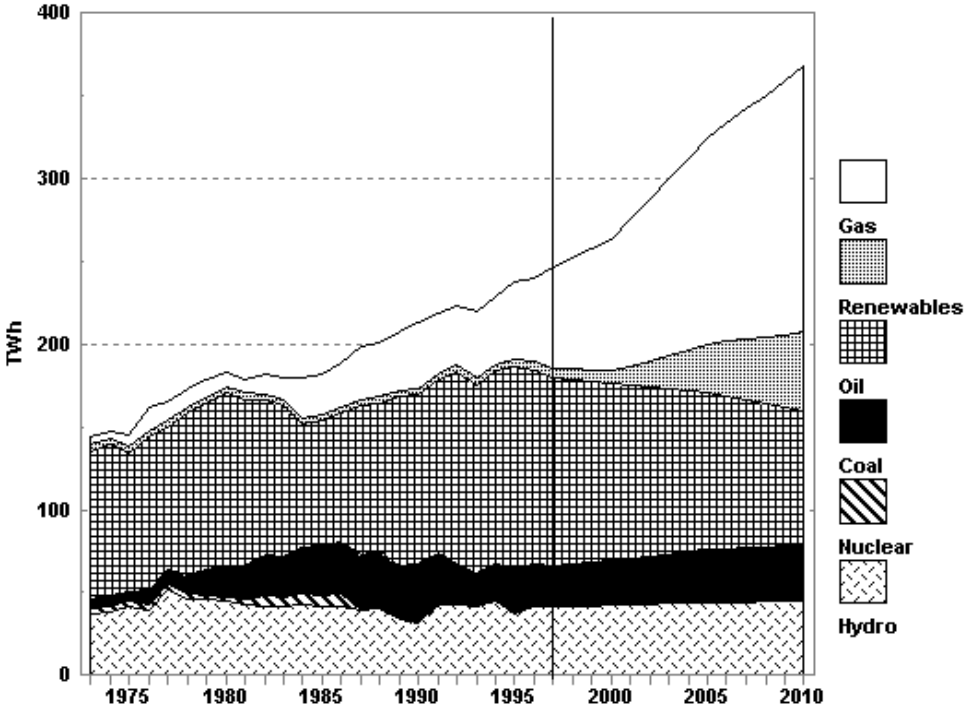

Figure 1 Electricity Generation in Italy by Fuel Type 1973-2010
Source: http://www.iea.org/pubs/reviews/files/italy99/986.gif

Prior to liberalisation of the electricity marker (in 1999), the Italian electricity industry was dominated by ENEL SpA - a single, state-owned, vertically integrated corporation. Around 80% of electricity was produced from thermal power stations (15% coal, 32% gas, 53% oil), 18 % from hydroelectric and 2% from renewables. Imports, in particular from France and Switzerland, played a very significant role in Italy, particularly after Italy abandoned nuclear power in 1987. As shown in Figure 4 below, ENEL controlled generation capacity producing around 70% of total electricity output, and distributed around 80% of all energy produced to consumers.

In line with European Parliament Directive 96/92/EC,[88] the Italian Government is implementing measures to increase the efficiency of the energy sector. The implementation of the Directive 96/92/EC was achieved through the adoption, on 16 March 1999, of a Legislative Decree (*Gazzetta Ufficiale, nr. 75* of 31 March 1999). The Decree establishes the general framework for liberalisation of the electricity market and provides for implementation of specific provisions of the Decree through actions by the Ministry of Industry and other competent authorities.

[88] See Appendix D for an outline of the legal and regulatory arrangements for Electricity in the European Union.

Figure 2 Italian Electricity market pre-liberalization structure

ENEL retains a dominant position in the new market structure but no longer has a full legal monopoly and is being required to divest assets to increase competition. ENEL was partially privatised by public float of 34.5% of its shares in November 1999 making it the largest listed utility company in the world.

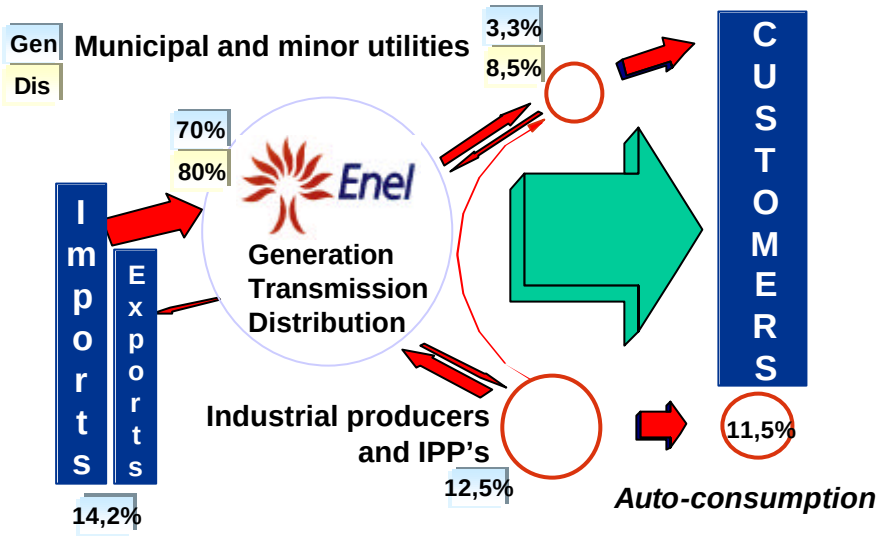

Figure 3 Italy's pre-liberalisation electricity industry structure.

The structure of the market is being modified by ENEL's divestment of 15,000 MW of its 55,000MW of generating capacity by 1 January 2003. This will reduce its share to less than 50% of the total Italian generating capacity. Moreover, starting from 1 January 2003, no operator will be allowed to generate or import more than 50% of the total electricity used in Italy. All new generation capacity will be open to competition using an "authorization system" complying with Directive 96/92/EC.

In addition, the retail electricity market is being progressively opened to competition[89] for eligible customers (mainly industrial customers) ahead of the timetable established by the

[89] Electricity supply is considered a public service in Italy. The opening of competition must be realised in accordance with public service obligations. Several duties and obligations imposed on different operators in the electricity sector fall within the scope of public obligations. In particular:
Managing of the network

European Parliament. The first tranche of customers (>40GWh/y) became contestable on 1 January 1999 and the second tranche (>20GWh/y) became contestable from 1 January 2000. Consortium and groups of customers located in the same municipality or in neighbouring municipalities with total grouped consumption of at least 20 GWh/y are also considered eligible (with a minimum consumption of 1GWh/y for each member of the consortium). This represents a market opening of about 35% of the Italian market.

From 1 January 2002 the threshold for contestable customers (and consortium) is fixed at 9GWh/y with the minimum consumption for the members of the consortium remaining 1GWh/y. All final customers consuming more than 1 GWh/y per site and with a total consumption of more than 9 GWh/y are considered eligible. This would result in a market opening of about 40% of the Italian market. It is also worth noting that it is proposed to modify the criteria of market opening which provides that, 90 days after the complete selling of 15,000 MW of ENEL generation capacity, the threshold for eligibility is lowered to 0.1 GWh/y (30 March 2003 at the latest).

Access to the transmission and distribution networks occurs under a regulated Third Party Access (TPA) system. The transmission system consists of all 220 KV lines or above and all the 132/150KV lines connected to a generation unit of at least 10MVA and which function as part of the national transmission network operation. A public company, the *Gestore della Rete di Trasmissione Nazionale S.p.A.* (the System Operator), established in 1999, has been charged with the management and dispatching of the national transmission system (a system operator role similar to NEMMCO's).

A Single Buyer ("*Acquirente Unico*") was constituted by the System Operator in 1999 with the responsibility of guaranteeing the supply of electricity to all captive customers (i.e. non-contestable customers). The wholesale market is organised on the basis of a Pool system, managed by a Market Operator ("*Gestore del Mercato*") responsible for merit order dispatching of electricity and of all the auxiliary services. The pool commenced on 1 January 2001, on the basis of conditions and rules of organisation to be established by the Market Operator, upon approval of the Ministry of Industry. Eligible contestable customers who do not want to participate to the pool system may enter bilateral contracts with an electricity

- The System Operator has the obligation to ensure the security, continuity and development of the network, and to connect to the network all those that so request; and to give priority electricity produced from domestic energy sources (subject to criteria defined by the Regulator - within limitations imposed by European Law).

Supply to captive customers

- The Single Buyer is obliged to guarantee the security, continuity and efficiency of supply to captive customers, to apply unique tariffs for captive customers - including a special reduced tariff for low income customers' basic needs.
- A Code of practice for electricity supply has been introduced by the Regulator, regarding customer disconnections for debt, complaints management, meters reading, billing, payments, non-payments handling.

Environment

- The System Operator also has an obligations to give priority to electricity produced with renewable and CHP plants (subject to criteria defined by the Regulator).
- Operators producing and/or importing more than 100 GWh are obliged, from 2002, to supply at least 2% (net of cogen, export and self-consumption) on the basis of renewable plants built or re-powered after the entry into force of the Decree.
- Other incentives for renewables are envisaged and will be determined with further provisions (capital grants assigned by Regions on the basis of competitive procedures).

producer, but they are subject to an additional fee to be established by the independent Regulator *(Autorità per l'Energia Elettrica e il Gas)*,[90] aimed at compensating extra-costs.

The Regulator set tariffs for the connection to the transmission and distribution network with "*Deliberazione n.13/99*" of 18 February 1999. Network access can be refused on the ground of lack of capacity and, in the case of imports, where reciprocity conditions are not allowed. Moreover, further provisions will be adopted regarding the environmental and economic compatibility of imports from non-EU countries. The Regulator is the dispute settlement authority concerning refusal of access.

With *Delibera 162/99*, the Regulator provided a procedure for the allocating capacity through interconnectors between Italy and neighbouring countries. Total capacity is allocated between captive and eligible markets (65%-35% according to market share for 2000). Operators and eligible customers needing capacity through the interconnectors must present a demand to the System Operator. Moreover, with *Delibera 180/99*, the Regulator fixed some additional rules for electricity imports in 2000:

- Increasing to 52% the capacity for eligible market (due to a corresponding lack of import request for the captive market);
- Limiting to 20% the total interconnector capacity available for each operator and, in any case, not more than 15% for each border (due to the impossibility to satisfy all requests coming from the eligible market).

The largest part of the national transmission network is owned by ENEL. Different companies (Edison, *Sondel, Ferrovie dello Stato*) and some municipalities own the rest. The System Operator carries out the activities of transmission, dispatching and management of the national transmission network, without discrimination between the owners or users. The System Operator also decides on maintenance and the development of the network. Ownership of the network will remain with the present owners (primarily ENEL), who are responsible of ensuring the execution of the decisions taken by the System Operator.

The different activities of ENEL (production, transmission, distribution, supply, etc) have been allocated to wholly-owned subsidiaries of ENEL SpA each of which is subject to the Regulator's *Delibera 61/99* that regulates unbundling of accounts applicable to the electricity undertakings. ***Si Gruppo Enel*** **is the wholly-owned subsidiary providing "Beyond the Meter" services in an unregulated competitive market.**

[90] The *Autorità per l'Energia Elettrica e il Gas* is the Italian Regulator created by Law 481 of 14 November 1995 and it is independent from the Government and from the industry. The Regulator is composed of a President (Prof. Pippo Ranci) and two Members (Mr. Giuseppe Ammassari and Mr. Sergio Garribba), appointed by the Italian President, after approval by the Parliament. They are appointed for seven years and cannot be re-confirmed.
The general tasks of the Regualtor are:
- guaranteeing efficiency and competition, conditions for universal service provisions and quality levels;
- defining transparent tariff systems;
- promoting and protecting the interests of consumers;
- advising the Government and the Parliament on electricity and gas supply structure.

The Regulator is in charge of defining the conditions of all the tariffs system and in particular access to the network and captive customers.

Pursuant to article 3 (11) of Decree n. 79 of 16 March 1999, the Government has established with Decree of 26 January 2000 the specific charges to be reimbursed to electricity operators. The maximum amount of these charges, which will be recovered through a levy on tariffs, is fixed at IT£15,000 billions. The European Commission must evaluate this regime under the state aid procedures.

5.2.2 ENEL's interval metering system

*Contatore Elettronic*o is the name of ENEL's project that includes a remote meter reading system, a customer management system, and a value added services delivery system. In particular, *Contatore Elettronico* includes an innovative system to remotely read and manage the domestic consumption of energy.

Metering groups have been designed by ENEL using the most advanced components and designers available in the market. The systems on which the project is based have been developed in conjunction with Echelon Corporation in the US and Ampy Automation Digilog Limited in the UK under the terms of formal technology development agreements. Echelon is to modify its existing technology[91] so that it can be incorporated into electronic interval meters specifically designed by Ampy.[92]

The system includes remotely controllable electronic meters in each home and building, data concentrators located in medium voltage/low voltage substations that feed power to the homes and buildings, and central servers in which the network data bases are located. Signalling between the data concentrators and the electronic meters will be implemented over the existing electricity distribution wiring using power line carrier (PLC) technology (Cenelec A band as main communication channel up to MV/LV substations) with Echelon's power line transceivers. Existing telecommunications networks will be utilised for signalling between the data concentrators on each MV/LV substations and the central servers.

Data management software has been designed in-house by ENEL.IT, ENEL's wholly owned information technology business that will allow access to the databases over an internet based system using TCP/IP communications protocols as indicated in Figure 5 below.

[91] Echelon has been manufacturing and selling electricity system control technology since it was founded in 1988. The communications protocols of the propriety power line carrier (PLC) technology has been adopted as National Standards in the EU, Japan and the US and, as such, is freely available to any manufacturer or user. Echelon has licensed manufacturing of its proprietary hardware technology at a relatively large number of manufacturers of electrical equipment and appliances and to some who manufacture control equipment that competes with Echelon's own hardware. Echelon has, however, established a niche speciality in PLC control hardware for MV and LV circuits.

[92] Ampy has recently been taken over by Email Meters, and Email has recently announced the release of a new, low cost single phase interval meters based on Ampy's very low-cost electronic accumulation meter that sells in the UK for around UK£11.50/unit (AU$34).

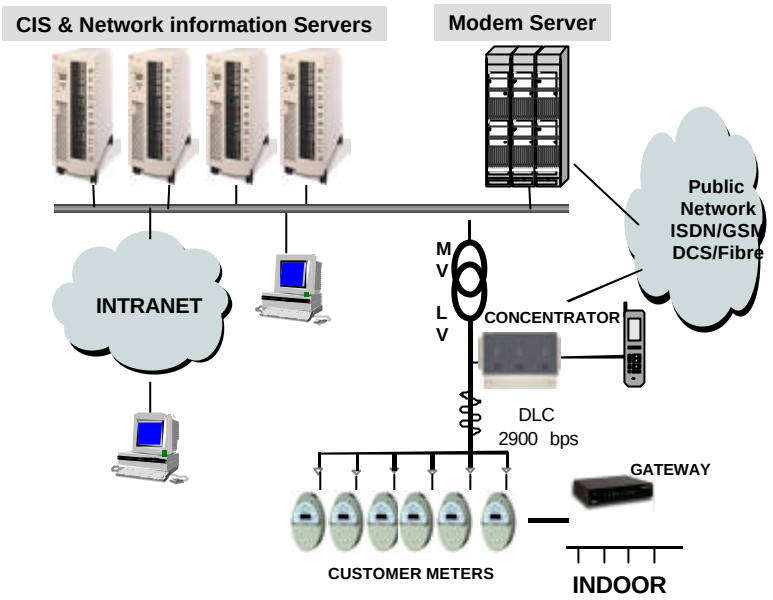

Figure 4: Diagrammatic illustration of the ENEL interval meter system

ENEL's decision to proceed with universal rollout follows a trial of the technology that began in 1997. ENEL already has 70,000 PLC communication meters in operation. The expanded roll-out will see approximately 27 million homes and businesses connected to this system - approximately 95% of all of ENEL's distribution customers.

ENEL estimates that the total project will cost around $3.3 billion (IT£3,600 billion) to connect 31 million metering points.[93] This is an average investment cost of just under $110/metering point. Echelon anticipates that more than $600 million (US$300 million)[94] of its products will be used over the three-year deployment period for Echelon chipset, LonWorld technology and additional products including, among others, data concentrators located in the electrical substations. The project will use Echelon's PLT-22 power line communications technology for communications between the data concentrators and meters, and from meters to suitably equipped appliances or equipment in customers' premises - although implementation of the latter capability is still under consideration as fees, economies and regulation authorization are under discussion. The devices in this network will be managed by ENEL.IT integrating Echelon's LNS™ software running on the central servers.

[93] ENEL estimates that a total of 31 million metering points will be connected to the system over the three year roll-out. This includes multiple metering points for some small consumers and a growth in consumers over the period.
[94] http://www.echelon.com/Company/press/2000/enelJuneMediaAlert.htm

ENEL will use its own field organisation to manage the on-site replacement of all existing electromechanical meters. The total period for the project is three years commencing mid-2001. The meter replacement program will be carried out in parallel covering all Italy.

ENEL has commenced procurement of the first year's supply of interval meters designed by Ampy through a competitive tendering process. Based on advice from Ampy about the cost of electronic accumulation meters produced in large production runs for sale in the UK and advice from a number of other suppliers (including Echelon) on the cost of developing interval meters incorporating the Echelon technology, we estimate that the breakdown of capital cost for major components in the system will be approximately:

- $20/metering point for the two-way PLC communications capability;
- $60-65/metering point for a communications ready, single phase interval meter;
- $25-30/metering point for installation of the meters and PLC technology.

From discussion with ENEL, Echelon and Ampy it appeared that each party had an expectation that the final average cost of meters could come in below ENEL's budget cost because of substantial competition for supply of the meters.

ENEL estimates that the cost of data management systems will be a relatively small component of the overall cost and the ongoing meter reading costs will be negligible compared to the overall operational savings it will achieve.

The Decision[95]

ENEL's decision to proceed with the project is driven by its estimate of strong cost reduction achievable through an Automated Customer Management System and from an increase in revenue through provision of a range of value-added services to consumers, competing energy retailers and appliance/equipment service providers. ENEL has justified the investment (around $3.3 billion) on the expectation of a payback period of just 4 years - achieved through operational savings in its distribution and retail business. Achievement of that outcome is dependent on approval by the Regulator of innovative tariffs for consumers seeking access to features such as load management capability

The initial set of services to be delivered by the system include remote meter reading, demand side management, and remote connection/disconnection of meters. Access services and value added services will be supplied to the "market" through an Access Provider company supporting independent service providers on a non-discriminatory basis.

The potential value added services that could be deployed through the *Contatore Elettronico* infrastructure over time include security monitoring, remote diagnostics for electrical appliances, and remote control of residences. These are "smart-house" services that will

[95] *Utility Value Enhancement through a new remote Customer Management System - ENEL Case*, Presentation by Alberto Perego at the LonWorks2000 Conference. http://www.echelon.com/company/investor/LonWorld2000/Session1/Perego-Enel/Perego-Enel.htm

require installation, replacement (or upgrade) of appliances, equipment and systems with compatible technology. Echelon already has licence agreements with a substantial number of appliance and equipment manufacturers in the EU, Japan and the US, all of whom are already producing compatible products.

The main benefits identified by ENEL for the system are:

- Strong cost reduction of serving LV customers in each of the following areas:
  - Meter purchase
  - Revision, modification, repairs
  - Logistics
  - Installation, recalls
  - Replacement
  - No access
  - Failure repairs
  - Connect/Disconnect
  - Meter reading
  - Invoicing
  - Payment collection
  - Bad debts
  - Customer service
  - Meter on-site verificaton
  - Fraud

  The only part of ENEL's business not impacted by cost reduction is "self-consumption" (on-site generation and consumption by ENEL's customers).
- Improve energy offer design and customer management
  - Offer design
    - multi-tariff
    - modulation of power available to customer
    - ToU/ToY contracts
    - Prepayment contracts
  - Customer Management
    - Automatic connect/disconnect
    - Contract modification
    - Information
- Enabling Home Service Platform (through value-added services)
  - Appliance monitoring and repair
  - Energy management

- Data acquisition and management for Water & Gas
- Security Service
- Home comfort
- Remote maintenance

5.3 Finding from review of low-cost interval meters roll-out

The key findings presented in this report are:

- We have identified three cases where low-cost interval meters have been rolled-out, or where roll-out will commence within the next twelve months. **Each of these roll-outs includes *low-cost, remote reading and feedback/control to the meters*.** The Power Line Carrier technologies[96] used in these roll-outs for remote reading and/or feedback/control of interval meters can allow consumers to obtain full benefits from the choices they make about consumption of electricity, either with or without retail competition.
- The cases where wide-scale, low-cost interval meter roll-outs are underway or about to commence are in Italy, Wisconsin and Puerto Rico.[97] Neither Wisconsin nor Puerto Rico has a current commitment to introduce retail competition for electricity. Italy commenced retail competition for electricity in 1999.
- These roll-outs have all occurred (or will occur) in an environment where a single monopoly distribution company has invested in the meters and remote reading technology that will be installed for all consumers. In the Italian case, the meter roll-out is occurring within an incentive price control regime similar to that of the UK (and by extension, all NEM jurisdictions). In Wisconsin, the roll-out has been explicitly approved by the Wisconsin Public Service Commission under a "cost-of-service" regulatory regime. The Commission explicitly acknowledged that consumers would benefit from the roll-out it has approved.
- A possible fourth example could occur in California if Governor Gray Davis accepts recommendations being put to him by various stakeholders at the moment.[98] A wide-scale roll-out in interval meters in California would be one of a set of desperate measures intended to put downward pressure on wholesale market prices by stimulating demand response from consumers.

[96] We do not endorse (or otherwise) the specific PLC technologies used in these cases that have been developed by either DCSI-TWACS or Echelon in the US. Other PLC technologies are available as are other low cost methods for remote reading and control/feedback that can assist automatic management of consumer load. We have been advised that implementation of such technology is feasible in the NEM, but that technical assessment and testing of distribution systems would be required before a detailed specification of any systems could be completed.

[97] While we have confirmed that a mass roll-out of remotely-read interval meters is underway in Puerto Rico, we have had insufficient resources or time to establish details of this roll-out.

[98] Information obtained during a recent visit by the author to California suggests that large-scale roll-outs of interval meters are also being considered in other US jurisdictions.

- We can find no examples of large-scale roll-out of manually read interval meters. While this is clearly feasible - and a better approach than use of load profiling - there are valid questions about the wisdom of implementing such a policy when low-cost remote reading of interval meters is proven. A roll-out of interval meters without remote reading/feedback capability restricts the benefits that consumers could derive from retail competition in electricity.
- **We can find no examples of low-cost roll-out of interval meters in any of the many jurisdictions that rely on competition and customer choice to initiate installation of interval meters**.
- The unit costs of the Wisconsin roll-out and cost for the Italian roll-out[99] are about the same or lower than the costs suggested in the IES report to the DBs **for manually read interval meters**. The initial investment cost for the Italian roll-out is just AU$110/metering point for interval meters with a flexible two-way communications technology that will allow automatic load management and a range of other services to be offered to Italian consumers by competing retailers. ENEL expects to recover the investment cost of this roll-out in just four years through improvements in its business and from new services that can be provided to customers in a competitive market. This makes a similar roll-out in the NEM look very attractive indeed, provided policies are put in place to ensure the low unit costs could be duplicated.
- The low-cost, two-way, remote reading/feedback functionality of these systems has clear potential to deliver greater benefits to consumers than would manually read interval meters. This has convinced policy makers, regulators and company executives that the investment in low-cost, remotely-read interval meters should proceed.
- The cases presented in this report also confirm that remotely-read, interval meters are essential if consumers are to access the majority of benefits available to them from competition in electricity supply. This is due, primarily, to the ability to link individual consumption to wholesale market price and network system performance; and to facilitate automatic, real-time, load management for individual consumers. Various technologies for low-cost remote reading also provide the opportunity for competing service providers to offer consumers access to a range of value-added services, some currently provided through "conventional" telecommunications.
- There is no evidence that load profiling has any benefit for consumers generally other than its relatively lower initial cost. Load profiling does not deliver any other quantifiable benefit to consumers as a group. Indeed, load profiling entrenches economically inefficient and inequitable cross-subsidies in the energy price component of retail tariffs. Load profiling will also entrench the incentives that contribute to the extreme summer peak problems that already exist in the southeast

[99] The official figure for the investment in remotely read interval meters by ENEL Distribuzione SpA in Italy is 3600 billion Lira for 30 million customer metering points.

> Regions of the NEM; and that are also manifesting themselves in the NSW and Queensland Regions.[100]

Our investigations conclude that California was the only jurisdiction in the US to employ "true" dynamic load profiling based on "live" representative group samples of interval-metered consumers. Even this has had no effect on demand behaviour of consumers as a whole. Nor is there any evidence that dynamic load profiling delivered any benefit to consumers during the dramatic increase in electricity prices that commenced in the 2000 summer.

[100] Prof Hugh Outhred of the University of NSW advises that there are signs that summer peak demand is increasing at a faster rate than average demand in both NSW and Queensland. This could lead to a re-run of the current problems in the southeast Regions.

6 OTHER ISSUES FOR THE ACCC

The material in this report supports that proposition that a universal roll-out of interval meters in the NEM - particularly sophisticated, low-cost, remotely read meters with similar functionality to those being installed in Italy - would allow consumers to gain access to the full benefits of competition for retail supply of electricity.

The wording of the ACCC's draft determination suggests that the Commission has not adequately assessed or understand the CEC's position on this matter. The Commission accurately paraphrases some of the key issues raised in the preliminary draft Executive Summary provided by Pareto[101] but later says only:

Even though the CEC cites examples where low cost remotely read interval meters have been rolled out in international markets, the Commission believes that this needs to be addressed in light of Email's comments. Email argues that international metering manufacturers are currently not interested in developing low cost meters to comply with Australian standards and conditions. Email suggest that a new and replacement strategy is sufficient to drive the necessary volume of production that is needed to reduce the price of interval meters, making it more likely that the market will consider a broader move towards interval meters. While, the Commission understands that the Office of the Regulator General (ORG) will shortly be consulting on a new and replacement meter strategy, the Commission is still concerned by the lack of commitment by other participating jurisdictions. The Commission is concerned that failure to consider this option is short sighted and may stifle innovation and any move towards a metering solution.

It appears that that the ACCC has either misunderstood evidence presented on behalf of the CEC and arguments put by Email, or shows no inclination to provide leadership that would remove the "logjam" in regulatory policy development caused by a *lack of commitment by other participating jurisdictions.*. As far as we understand, Email's position is that it is only current regulatory policies (supporting continued use of basic accumulation meters and NSLP) that prevent meter manufacturers (international or local) from supplying low-cost interval meters to Australia. The ACCC expresses concern about the same issue but shows no inclination to do anything about it other than to refer the matter back to the same jurisdictions that are responsible for the "logjam" in the first place.

This is an unacceptable situation for consumers. The ACCC is the "premier" regulatory authority under NEM governance arrangements; and it is the only decision-making authority that is (supposed to be) truly independent of jurisdictional interests; and the only national regulatory body whose prime objectives are to consider the interests of **consumers** and **competition**. The CEC can only hope that the ACCC will take the opportunity to reconsider its position in the light of further details provided in this report and amend its final

[101] p10, ACCC.

determination to ensure that the interests of consumers will be promoted through more effective competition in the retail electricity market.

If the ACCC is not prepared to show policy leadership, but is concerned about recalcitrant jurisdictions, it would be far better for consumers to impose a condition on authorisation for FRC Code changes that delays their implementation until after the jurisdictions have "got their act together".

In considering this matter as part of its determination on authorisation of Code changes for FRC, there are other issues that the ACCC should also reconsider. This section outlines the two of most concern to consumers: the total cost of FRC, and the problem of market power abuse in the NEM.

6.1 The cost of full retail competition

An issue of considerable concern to consumer groups is that the FRC timetable is driven purely by political considerations, while no jurisdictional government has produced comprehensive or reliable information on the estimated cost of FRC or the benefits it could deliver. The little public domain information that is available suggests the cost will be substantial, possible running to several billion dollars. What is known is that:

- NEMMCO will incur substantial costs for development and operation of systems necessary for settlement of wholesale market transactions relevant to each of the nearly 7 million contestable customers involved in the NEM. NEMMCO's systems will track the energy usage assigned to every consumer for each half-hour settlement period in the wholesale market and link this information to the relevant retailer (one of 20+) for that consumer. NEMMCO has not disclosed the magnitude of these costs, but they are believed to be in the order of $120-150M over the first five years of FRC.
- Retailers will incur costs for system development to interface with NEMMCO's central settlements systems. There is no reliable, public domain information on these costs, but they may run into $10s of millions for each of the major retailers.
- In addition, all retailers will need system "builds" to track charges and payments to each distributor who provides network services to their customers. Each distributor will need equivalent systems to track charges and payments to retailers.
- Recovery of some FRC costs has been approved by the Office of the Regulator General (ORG) in distribution use of system (DUoS) charges and in Default Tariffs for (supposedly) competing incumbent (or Host) retailers in Victoria. Similar arrangements have been approved for NSW distributors and incumber Host retailers.
- The exact magnitude of cost recovery approved by regulators/jurisdiction is not entirely clear. What is clear is that approval of this cost recovery has occurred without any effective involvement of consumers or their representatives - simply because they have not had adequate resources to participate in the process, and in some cases,

because the decision making processes have been conducted without adequate public consultation.

- In addition, NSW retailers (and generators) have their risk to wholesale market price volatility "managed" through the government operated Electricity Tariff Equalisation Fund (ETEF) - for that part of their load associated with 1st Tier "Small Consumers".[102] NSW consumers in their role as taxpayers carry the cost of this risk "insurance". No other jurisdiction is (yet) offering their incumbent retailers the same form of "free" (and, one ***should*** argue, anti-competitive) risk cover.[103]
- Other FRC costs, including all those incurred by truly independent retailers (i.e. retailers not "protected" by incumbency in one of the jurisdictional franchises) are to be recovered in the competitive market. The question of whether, and to what extent, costs for incumbent retailers to participate in so-called 2nd Tier competition may be smeared through regulatory/jurisdictional approved DUoS charges or Default Tariffs is unclear.

We believe that it is appropriate for the ACCC to consider the magnitude of these costs when it assesses the Public Benefit of approving changes to the National Electricity Code (Code) that will be required to authorise metering and/or load profiling for FRC. The ACCC should require public disclosure of the cost of pursuing FRC, particularly to a timetable that will make it impossible for any other "solution" for wholesale market settlement **except load profiling** to be used.

6.2 "Market Power Abuse" - the major policy concern for consumers

A major risk to consumers in FRC (apart from the very high "fixed" cost that is being incurred simply because governments insist on FRC proceeding) is the effect on retail prices through (currently "Code compliant") exercise of "market power" by generators.

This sort of behaviour has contributed markedly to dramatically increasing average spot market prices in Victoria, NSW and the Snowy Regions over the 2000-01 summer. Figure 5 below shows that 12 Monthly Moving Average (12MMAv) spot market price in the NSW, Victorian and Snowy Regions of the NEM has increased by more than 100% in the last 12 months and by nearly 300% since mid-1998.

This is partly due to the tightening supply-demand balance (which **might** be considered to be acceptable), but it is also occurring because of behaviour that has been identified in the UK

[102] "Small Consumers" are defined as any NSW consumer who uses less than 40MWh/y that remains with, or returns to, their incumbent Host retailer during the (unspecified) life of the ETEF. Small consumers are responsible for approximately 45% of total load in the NSW Region of the NEM.

[103] The ETEF appears to create other undesirable (and anti-competitive) distortions to the wholesale market. For a start, Small Consumer load is withdrawn from the hedge market. It is suggested that this has markedly reduced liquidity of the fledgling energy Futures Market; and, one would expect, reduced the attractiveness of NSW incumbent retailers as hedge parties to non-NSW generators. Lack of hedge cover for this load also frees NSW generators from the discipline that hedging contracts imposes giving them less incentive to achieve high levels of plant reliability, greater flexibility to "game" the market, and an opportunity to "export" output to other NEM regions for sale outside the constraints of the ETEF. **These symptoms are eerily similar to some of the conditions that existed in the Californian market.**

and US electricity markets as “market power abuse”. The fact that 12MMAv price in all Regions of the NEM is now well above accepted estimates of “efficient” new entrant costs also suggests that the design of the NEM is flawed. If the NEM was both truly competitive and efficient, market theory would suggest new entrants would come into the market when there was an expectation of the price rising above efficient new entrant costs. The fact that this does not occur is accepted as evidence of “market design flaws” in all US markets and in the UK.

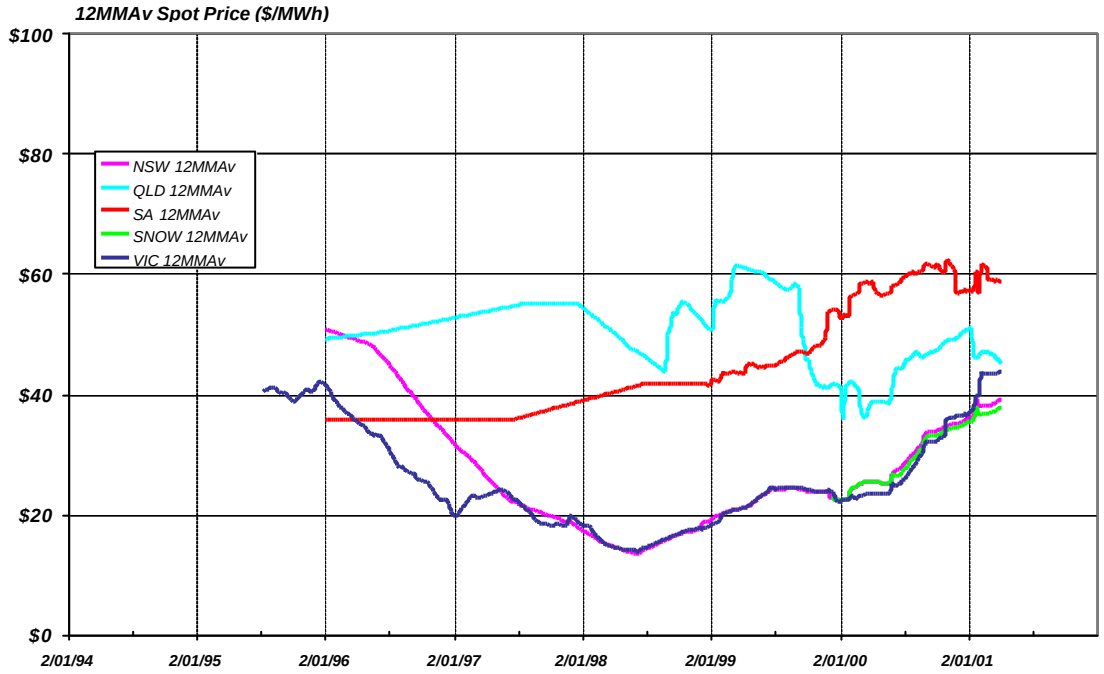

Figure 5 12 Monthly Moving Average Wholesale Price for NEM Regions
Source: VPX, NEMMCO, Bardak Energy Services (pre-NEM price in SA, NSW and QLD Regions)

Exercise of market power could very easily push the wholesale market price well above currently "approved" energy component prices of Default Tariffs and affect the price of hedge contracts between retailers and generators.

In a "worst case" scenario, "well-behaved" generators could be incentivised by the "success" of generators exercising market power to withdraw capacity from the hedge contract market - or, as was the case in California, to price hedge contracts at levels that retailers consider to be intolerably high and unrelated to the economic fundamentals of the market. If that occurs, there will be enormous pressure from incumbent Host retailers to increase Default Tariffs - and unstoppable pressure for 2nd Tier retailers to pass on higher prices to "contestable" customers. If this scenario becomes reality, failure by regulators to allow increases in retail prices would initiate a "California-type" financial failure of retailers; **and failure by**

regulators to act against market power abuse would initiate a political backlash against market reforms.

Risks to consumers from market power abuse by generators do not go away if NSLP (or any form of load profiling) is retained. In fact, the risk of price rises is even greater with load profiling because the incentive for consumers to respond by reducing consumption is virtually eliminated by lack of price signalling and "cross-subsidies" in the load profile.

Demand response from consumers can contribute to market power mitigation, but it will never be sufficient to prevent it occurring. Mitigation of unacceptable generator market power can only be achieved by fundamental changes to market rules, by vigilant monitoring of generator behaviour and by the imposition of penalties on those found to be exercising unacceptable market power; or by further and more drastic structural change including construction of more capacity and introduction of more competition - neither of which is obviously in great abundance in the NEM.

Mitigation of market power *cannot be achieved by any proposed or possible FRC policy initiative*. There is no evidence from anywhere in the world that demand side response can counter generator market power of the type currently evident in the NEM. This is occurring by economic "withholding" and rebidding of blocks of capacity of more than 1000MW at any one time - and at short notice.[104]

It is of major concern to consumer groups that neither NECA nor the ACCC is treating the need for effective market power mitigation measures seriously. The ACCC cannot ignore this issue. In December 2000, the ACCC endorsed an increase in the NEM Price Cap arrangements, including a doubling of the short-term price cap VoLL from $5,000/MWh to $10,000/MWh in April 2002.[105] This change will mean that Australia has a wholesale electricity market with, by far, the highest short-term price cap in the world.

Part of the "justification" accepted by the ACCC, on the *"intellectual strength*[106] *of … argument(s)… put by NECA"* for the increase in the NEM price cap, is that it would

[104] Economists who proposed the single-priced-auction model accept there is a clear incentive for behaviour such as "rebidding" and capacity manipulation by producers to occur, but the theory suggests it is not **necessary** to "rebid" to **artificially** force prices higher. In a truly efficient and competitive (single-price-auction) market, any clearing price not related to the "economic fundamentals of supply and demand" is inefficient. The theory suggests prices will rise above the SRMC of low SRMC plant as higher SRMC plant is despatched. At the extreme limit, it is efficient for the last increment of peak load plant to bid a SRMC at the long-run average cost since, **for that plant only**, the SRMC **must** include an allowance to recover all of the capital cost. The "desired" (and theoretical) outcome is that the overall average revenue stream to each participating generator is, in the long term, at least equal to the cost of efficient new entry.

Re-bidding to artificially raise prices is a clear sign of market "failure", particularly in electricity markets with extremely low demand elasticity, because it inevitably leads to long-run average prices well above efficient new entrant costs. Theoretically, it should be unnecessary for a low SRMC plant to re-bid at a higher price. If the low SRMC plant does so, it is only because of market imperfections (or fatal flaws). On that ground, rebidding should be outlawed under any circumstance - or effective market power mitigation measures introduced to disincentivise such behaviour.

[105] *Determination - Applications for Authorisation - VoLL, Capacity Mechanisms and Price Floor*, ACCC, 20 December 2000

[106] We strongly disagree that NECA's arguments has any intellectual strength. NECA's arguments are narrow, simplistic and out of step with every other similar or related regulatory body in the world. The reasons for holding this view are presented in a submission prepared by Pareto for the Energy Users' Group of Australia - *Australian Competition and Consumer Commission, National Electricity Code VoLL Review, Response to Draft Determination - an End-Use Customer Perspective*, EUGA, August 2000.

incentivise demand side response in the NEM. We accept that stimulation of demand response is a fine policy objective. If the policy were followed through to a **logical** conclusion, it could create substantial opportunities for small consumers to benefit from voluntary load management.

However, the ACCC's VoLL decision (and the NECA proposal on which that decision was based) is only one part of a complex process of changing consumer response in the wholesale market. **Consumers also need price signals, a capacity to respond automatically and conveniently to the price signals and a mechanism for capturing the benefits. They also need to change their expectations about supply availability and reliability**. **In addition, they also need to be assured that exercise of unacceptable market power by generators will not render meaningless any sacrifice they make by voluntary load management.** ***Only then will they be incentivised in a positive manner.***

Interval metering is part of the infrastructure that would achieve this; but much more is needed. The current direction of jurisdictional policy seems set to "institutionalise" load profiles and "frustrate" the roll-out of interval meters. This has the obvious effect of completely removing "price signals" for the 40-45% of system load (and the very critical, temperature responsive extreme peak load) used by small consumers.

Although we were scathingly critical of the VPX/Monash study on the "value of lost load" in the EUGA VoLL submission, we do agree with one "observation" from this study. That is, the vast majority of small consumers, particularly residential consumers,[107] place a lower "value" on supply interruptions than do "economically productive" consumers. Perhaps more importantly, interruptions actually **cost** small consumers less in cash. Relative low value (compared to industrial/commercial consumers) gives Residential consumers an opportunity to "offer" voluntary load curtailment to the "market", **and to be paid for doing so**. But that implies an ability to deliver price signals, an ability to respond, and an ability to be identified for the purpose of allocating the benefit. **This cannot be done with load profiles**; nor can it be done as efficiently or as conveniently with manually read interval meters.

6.2.1 Demand response and generator market power abuse

Despite the fact that demand response from consumers cannot fully suppress market power abuse by generators, it can make a contribution; and it is a contribution that has real value - value that would be more likely to be delivered if interval meters were rolled-out across the NEM - a fact ignored by IES in its cost-benefit analysis.

IES says that *peak load reduction can be achieved in both the under 160MWh/year market and with large customers who are currently contestable. Peak load reduction in the over 160MWh/year market both complements and competes with equivalent reductions in the*

[107] There are some small consumers for whom supply reliability is, literally, a matter of life and death - those who require constant supply reliability for life support systems. These consumers would, quite rightly value supply reliability extremely highly.

under 160MWh/year market.[108] *To the extent that large customer load response does occur, it will detract from the benefits attributable to small customer load response.*[109]

This is true to the extent that IES is seeking only to estimate the direct benefit from reduction in investment required to meet peak demand in the generation, transmission and distribution sectors. However, IES overlooks the very positive contribution to mitigation of market power abuse by generators that demand side response **from all consumer groups might make.**

The value to consumers (and retailers) that demand response contributes to mitigation of market power abuse by generators **increases** from contributions by all consumer classes. It is unrealistic to think that large (or small) consumers only could create sufficient demand response to counter the behaviour of generators as they seek to (artificially) drive wholesale market prices higher.

In several cases, as illustrated in Figure 6 below, even NECA has reported that Loy Yang Power (in the Victorian Region) has rebid (and consequently economically withheld) around 1000MW of capacity from the wholesale market in successful attempts to drive the wholesale market spot price higher - even when system demand was well below that maximum capacity that NEMMCO says exists in the Region.[110]

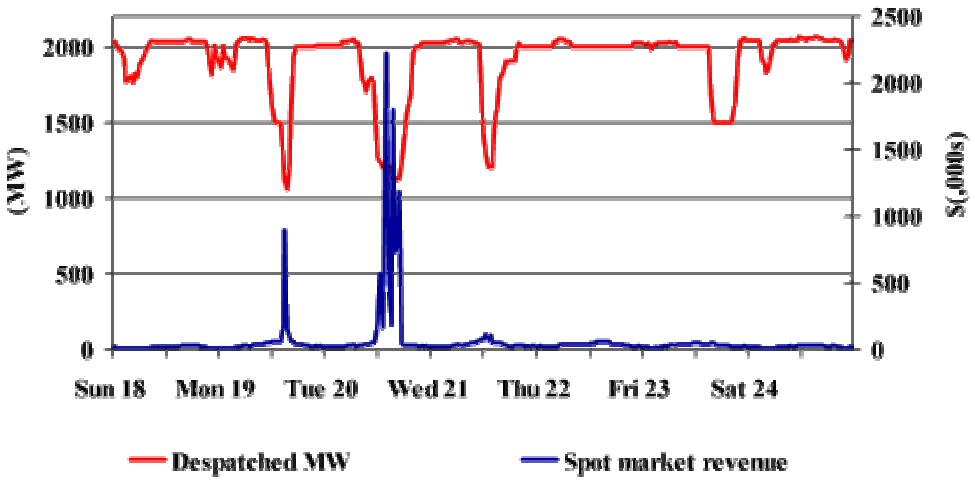

Figure 6 Loy Yang despatched generation and spot market revenue February 2001 (Source: NECA)

No realistic amount of demand response from large consumers can hope to "match" this behaviour. Indeed it may not even be possible for all consumers voluntarily acting together to

[108] IES, p35
[109] IES, p39
[110] Market Analysis report 18-24 February 2001, NECA.
http://www.neca.com.au/MarketSurveillance.asp?CategoryID=39&SubCategoryID=190

do so. The behaviour of Loy Yang Power reported by NECA is not unique, nor is the example presented by NECA isolated. Bardak Energy Services has documented similar behaviour by Loy Yang Power and Hazelwood Power (in the Victoria Region), Macquarie Generation (in the NSW Region) and Northern Power (in the SA Region) over the 2000-2001 summer.[111]

Generators have an incentive to engage in this sort of behaviour only because:

- they can "play" in the wholesale market without hedge contracts for the capacity economically withheld;
- there is insufficient demand elasticity (currently) in the market; and
- the Code "allows" this behaviour.

Not only does this give generators the option of attempting to maintain high spot prices **despite demand response from consumers**; but failure to enter hedge contracts by generators also means that retailers and consumers are directly exposed to the risk of high wholesale market prices to the extent that unhedged generation capacity is required to meet demand. This means that even if demand response from consumers cannot "stop" market power abuse, it has the effect of reducing the total value of energy sales during high price periods.

It is inevitable that FRC will more directly expose all consumers to the impact of wholesale market electricity prices - with "protection" offered by regulated energy tariffs and Vesting contracts being phased out. Indeed, Ernst & Young in their paper to the Victorian government suggested that *cost reflectivity and price signalling* was *particularly important to Victoria where summer peak Pool price volatility creates a need properly to allocate the additional peaking costs produced by various load types including air conditioning.*[112]

Interval meters "connect" the half-hourly consumption of individual customers to real-time prices in the highly volatile wholesale market. This, of course, does not mean that individual consumers should or would be fully exposed to wholesale market price volatility. The degree to which customers are impacted by wholesale market prices depends on the service offering agreed with their retailer[113] - and, ultimately, the customers' energy consumption choices.

Retailers also bill their customers using information from interval meters; and the same information can be used by the customer and competing retailers to develop alternative service offerings. This allows customers to gain real benefit from competition in the supply of electricity, to exert real and effective economic power and, if they so choose, to benefit through targeted load management.

[111] *How to Succeed in the Electricity Business Without Really Trying - Withholding Capacity in the National Electricity Market,* BARDAK Group, 8 February 2001.
[112] *Review of the Victorian Distribution Businesses' Preferred Trading Arrangements:,* Ernst & Young for Victorian Department of Treasury and Finance, June 1999, p4.
[113] Retailers (and, hence, their customers) can spread the risks of volatile wholesale market prices by contracting direct with generators, by financial hedging to cover the wholesale energy price risk, or by offering customers demand management options. But this form of protection is voluntary in the NEM. If generators choose not to enter hedge contracts then both retailers and consumers will be fully exposed to wholesale market price risk to the extent that generation capacity is withheld from the contract market.

6.2.2 The role of retailers in managing wholesale market price risk for consumers

Prof Stephen Littlechild, the former Director-General of OFFER in the UK, has provided an eloquent explanation and defence of the value-adding role that retailers can and should play in managing and moderating the wholesale market price risk.[114] In effect, Littlechild argues that retailers are free to hedge against wholesale market price volatility in ways that totally determines the price they actually pay for energy - and, by extension, the price they charge their customers. Retailers can also use their buying power to achieve efficient, competitive prices by hedging with new entrants and with a portfolio of generators.

If retailers take a long-term position in the hedge market they can substantially eliminate the risk of price run-ups during times of supply-balance constraint. However, this cannot protect their customers from system reliability problems due to too little capacity being available (or presented to market) unless all other retailers take the same long-term view; and it may leave retailers exposed if they cannot match hedge contract commitments to retail sales.

However, Litlechild's primary contention could be over-optimistic because it presupposes willingness to contract and ignores to some extent that fact that both retailers (and generators) face uncertainty in negotiating hedge contracts for the following reasons.

- There is difficulty in determining the volume of energy that individual retailers will supply where consumers are free to change retailer at any time. In order to manage this particular risk - in the absence of a liquid contract market - retailers either need to extend their role as energy traders to -
    - sell any "excess" energy in the spot market if they have more energy covered by hedge contracts than they have retail contract commitments, or
    - buy any "deficit" energy from the spot market for which they have retail contracts but no hedge contract backing.

  In either of these situations, retailers and generators are exposed to the wholesale market price risk to the extent that there is a difference between their estimated and actual requirements. A number of retailer representatives have suggested in public forums that a "desirable" target is to limit spot price exposure to less than 5% of committed retail contract load, although this is clearly a factor that would be determined by the "risk appetite" of individual retailers.
- Consumers show little inclination to commit to long-term contracts with retailers. The "benefits" for consumers from competition comes from their ability to select retailers who can offer the most attractive supply arrangements. If consumers make a long-term commitment to one particular retailer, they lose access to innovative offerings from other retailers during the term of the contract.

[114] *Why we need electricity retailers: A reply to Joskow on wholesale spot price pass-through*, Stephen C Littlechild, 22 August 2000. Available as WP 21/2000, Research Papers in Management Studies, Judge Institute of Management Studies, and DAE Working Paper 0008, Department of Applied Economics, University of Cambridge, England

On the other hand, consumers show a very strong inclination to buy energy in an arrangement where the future price is known. Only one end-user amongst those supplied at the 33,000 contestable sites above 160MWh/y has elected to buy energy directly through the sport market.

- There is a varying "balance of terror" as the supply-demand balance changes in the wholesale market.
  - When supply exceeds demand by a significant margin, as it did in the Victorian and NSW Regions of the NEM up until the middle of 2000, the average wholesale market price tends to be substantially below the total costs (including an adequate return on capital) incurred by generators.

    This gives retailers the "upper hand" in the "balance of terror" and puts generators under substantial pressure to agree to contract prices below what they consider to be reasonable.

    However, generators would not be inclined to agree to long-term commitments at (what they believe to be) unsustainable prices because they know that low wholesale market prices will act as a deterrent to new entrants and that, eventually, the supply-demand balance will tighten.
  - When the supply-demand balance does tighten, as it has in all Regions of the NEM except perhaps NSW and Queensland, the average wholesale market price can rise very rapidly to be very substantially above efficient costs for new entrants.

    This gives generators the "upper hand" in the "balance of terror" but also acts as a deterrent for retailers to agree to long-term contracts because they also know that, eventually, new entrant capacity will come into the market.
  - There is also a severe risk to generators during periods of high prices, particularly if they have entered into hedge contracts but are unable to operate.

    Under those circumstances, a generator not able to meet its hedge commitments by despatching energy to the market could be forced to by energy on the spot market at a very much higher price than its unit cost. This provides a very strong incentive for generators to "self-insure" by not offering some of their capacity for hedge cover with retailers.
  - In the worst case scenarios -
    - Retailers may chose not to enter into hedge contracts when the average spot market price for energy is low thereby exposing generators to sustained periods of revenue flow at levels that will not meet their total costs (particularly payments to shareholders and bankers);
    - Generators may chose not to enter into hedge arrangements when the average spot market price is high thereby exposing retailers to periods of extremely high price, particularly during periods of supply constraint when the sport price may reach the short-term price cap (VoLL).
    - In these cases there is the potential for financial failure of generators in the first case and retailers in the second.

- Generators who decline hedge contracts also have a clear incentive and much greater option to "game" the market and manipulate the wholesale market price by economically inefficient exercise of market power.

➢ This "balance of terror" is not conducive to successful negotiation of long-term contracts at the wholesale or retail level that will always contain fair and reasonable terms.

Inevitably, even retailers and generators who are the most competent risk mangers will chose to trade part of their load in the spot market. This exposure to wholesale market price risk has the potential to a major risk for consumers, **but it also provides significant opportunities for consumers who are able to vary their electricity consumption at will**. During periods of high wholesale market spot prices, voluntary load management can be of considerable value to retailers and generators seeking to manage the wholesale market price risk.

Given that there will always be a margin of Retailer load exposed to wholesale market price volatility and generators only have incentive to practice market abuse when they face no contract risk, active load reduction when generators "abuse" the market will always be valued at the prevailing wholesale market price - up to VoLL (i.e. either $5,000/MWh up to 30 March 20002 or $10,000/MWh after April 2002). Also given that a number of generators exhibited this behaviour last summer, it will be very surprising indeed if it **doesn't happen next summer and every other summer (or even winter) until substantial new capacity investment occurs. Given the disincentive that low wholesale market prices have on new capacity investment, it may even be reasonable to expect that (in the absence of direct intervention by government - or fundamental changes to the NEM market design) tight supply-demand balance will remain an endemic feature of the NEM.**

Under those conditions, it would not take many MW or many hours to **realise** a benefit that approaches the same order of cost as a large-scale interval meter roll-out, should simultaneous VoLL events occur in, say, the NSW, SA and Victorian Regions of the NEM. Even one half-hour when the system **depends** on the 1000MW that might be bid at VoLL will be "worth" $5 million after April 2002. Given that only one generator might be able to set VoLL by re-bidding high prices because they are uncontracted, means that consumers responding with even part of that load would deliver an immediate and direct cost saving to retailers (and, through competition, consumers).

If there were, say, 0.5 million[115] consumers using a "standard" 2.4kW reverse cycle AC across the NSW, SA and Victorian Regions, and retailers were able to stimulate a response from one quarter of these,[116] this could reduce energy purchase costs by around $3 million in a single half hour when energy prices reach VoLL (after April 2002). $3

[115] It is understood that one Victorian urban distribution business estimates it has around 400MW of temperature sensitive AC load. This is roughly equivalent to around 165,000 "standard" (2.4kW) reverse-cycle ACs. On that basis it appears to be a reasonable assumption that there might be at least 500,000 ACs operating across the three NEM Regions on a hot summer's day.

[116] We emphasise in this report that a major challenge in a competitive retail market will be to stimulate the interest of consumers in voluntary load management. However, we also note that some US utilities report positive responses to the incentives of interruptible AC tariffs - and that policy makers are considering these types of approaches to mitigate the effects of the energy supply crisis in California.

million saved in 10 half hours *over one summer* would pay for roll-out of 270,000 remotely read interval meters using the Italian costs - even if there was no other benefit. The NPV of future net benefits would be much higher once the initial investment cost was recovered.

On the other hand, there is no way that an individual consumer can "extract" the value associated with voluntary load management if they are supplied under any form of averaged load profile. By definition, a load profile assumes that all consumers assigned that profile have the same consumption pattern making it is impossible to distinguish any individual consumer's usage patterns from that of any other consumer.

Overseas experience jurisdictions shows that consumers are unlikely to get any direct benefit from competition in electricity ***alone* if they are supplied under a load profile**. They **may** get benefits from competition **if that occurs for multiple utility services at the same time and if a consumer is able to bundle those services for offer to a single, multiple utility retailer.** This is notably the case in the UK. There have been several reports from the UK on the benefits to consumers of competition in electricity.[117] However, the anecdotal tales are substantially different. For example, a small consumer living in a quiet valley in rural Wales supplied with electricity under a load profile **who is not a gas consumer and who does not want a mobile 'phone** has no success in getting offers from competing utility retailers.[118]

The fact is, a single utility, small consumer supplied under a load profile is simply not attractive to retailers because they are unable to distinguish that consumer from another with a different energy consumption pattern. The only basis for competing is in the retail margin or by offering additional goods and services unrelated to electricity consumption.

6.3 Key issue to be re-considered

The key issue that needs to be re-considered by the Federal and jurisdictional governments, and the ACCC, is how to develop and support policies that are likely to achieve outcomes in the NEM similar to those in the cases of actual interval meter roll-out outlined in this report. This will be a challenge given the Federal Minister's stated preference for "*market-based incentives*". We reiterate, **competition in metering service does not deliver the desired outcome - anywhere in the world.**

If the Federal Government and the jurisdictions wish to achieve the stated policy objective of rolling out large numbers of low-cost interval meters, it will be essential to re-visit the reliance on market-based incentives in this area.

[117] For example: *Giving Domestic Customers a Choice of Electricity Supplier*, Report by the Comptroller and Auditor General, HC 85 Session 2000-2001: 5 January 2001

[118] The author is indebted to Bill Henley of NEMMCO for this factual account from a recent visit to the UK that confirmed other similar stories.

It is our recommendation that policy makers should also examine every possible option for promoting the roll-out of low-cost remote reading/feedback functionality to every interval meter. This provides the mechanism for developing automatic (and therefore more convenient), real-time, demand response from individual consumers. We stress that the challenge of encouraging voluntary acceptance of demand response from individual consumers should not be underestimated. Over generations, consumers have come to expect that electricity would always be available **constantly, and at the "flick of a switch", and at a moderate and predictable price.** The electrical installations in consumers' premises have been "hard-wired" as though this axiom would always be true. Effective voluntary demand response will require consumer acceptance of a different level of supply surety - and that a change in behaviour and expectation will be in their individual interests. Considerable care will be needed to educate consumers and assist them come to terms with the change in expectations and behaviour that this will require. Utilising **and adequately resourcing** the support of consumer advocacy groups could best achieve this goal.

7 WHAT SHOULD THE ACCC DO?

The ACCC has been asked to approve amendments to the Code for FRC. In doing so it must satisfy itself that the Code Change proposals deliver Public Benefit. The provisions of the Trade Practices Act that refer to Public Benefit do so in the context of exemptions from the general principles that underwrite the Act. However, we argue that, in this case, the ACCC must take the most liberal view possible of the meaning of Public Benefit.

The Code Change proposals affecting interval metering and profiling are based on the assumption that competition in metering services will deliver benefits to consumers. The evidence in this report shows that the roll-out of interval meters is one case where reliance on competition has not delivered outcomes consistent with achievement of Public Benefit that successful roll-out of low-cost, remotely-read interval meters could deliver.

We have also argued that achievement of Public Benefit requires assessment of the costs and benefits of FRC. This, logically, requires disclosure of the costs **and** allowance of time to install infrastructure that will ensure there is at least an option for consumers to pursue the benefits that competition in retail electricity supply could bring.

Our recommendations to the ACCC are:

- To ensure that the ACCC is able to properly assess Public Benefit from the proposed changes to the Code, the ACCC should make it a condition of authorisation that jurisdictions conduct a full, complete and professionally competent cost-benefit analysis for FRC.

  This cost-benefit analysis should include a reliable and public estimate of the costs to be incurred **by all parties** and a detailed estimate of benefit to distributors, retailers and consumers **for both load profiling as proposed and low-cost interval meters that this report shows is achievable**.

  The analysis should examine the costs and benefits of both manually read interval meters and low-cost remotely-read interval meters; and it should examine the impact on both costs and benefits of delaying commencement of FRC until:

  - all jurisdictions are ready to commence, preferably with common rules and regulations in each jurisdiction that may assist cost minimisation of retail overheads;
  - there is effective roll-out of sufficient low-cost interval meters to ensure a positive net benefit to all consumers;
- The ACCC should not finalise authorisation of the Code for FRC unless this cost-benefit analysis shows a positive net benefit to consumers.
- The ACCC should not approve Code changes that rely on competition for metering services to achieve roll-out of the low-cost interval meters that will be necessary for

consumers to have an opportunity of obtaining the greatest benefit from retail competition in electricity.

Rather, the ACCC should reject Code changes that depend on competition to deliver the benefits of low-cost metering services and make it a condition of authorisation that all aspects of meter services including ownership, installation, and meter reading continue to be regulated as a monopoly activity until there is clear evidence that competition is capable of delivering at least the same benefits to consumers.

We note that this may require monopoly metering services to be legally separated from the retail activities of distribution businesses to ensure that open access to interval meters, remote reading technology and/or interval meter data and competitive neutrality is **seen to be achieved.**

- The ACCC should make it a condition of authorisation that NECA develop a competent and comprehensive market power monitoring and mitigation program for the NEM; and that NECA develop Code change proposals to implement an effective program to control, or preferably, eliminate market power abuse by generators before FRC commences.

If these conditions can be achieved it is far more likely that consumers will have the opportunity to derive benefit from competition for the supply of one of the most important services that affects almost every aspect of modern life.

APPENDIX A - TERMS OF REFERENCE

The consultancy project involves commissioning Pareto Associates Pty Ltd to prepare a report (or reports) that examines and compares the case for profiling and universal interval meter roll-outs as part of FRC implementation. A key element of this project will be to review information on interval-metering and profiling costs. This will focus on a review, critique, comment and consumer-focussed response to key documents prepared, or referred to, by government policy units and regulators in Australia.

The project scope would also include a brief review of similar policy developments in overseas jurisdictions and actual experiences in overseas jurisdictions where decisions have been made to commence roll-out of interval meters. This would include obtaining, analysing and comparing data on actual implementation costs for profiling and interval meter roll-out; and the expected benefits to customers and service providers.

In addition, proposed metrology procedures for FRC would be reviewed (funds permitting) and a consumer-focussed response to these proposals prepared.

The objectives of this initial work would be to identify issues of relevance to consumers, and define and articulate them in ways that will assist the understanding of consumers, regulators and policy makers. It would also involve initial development of policy solutions that would increase the role of demand management and increase economic power of consumers in the electricity market.

APPENDIX B - US STUDIES OF METERING OPTIONS AND COSTS

"Cost impact of competitive and network metering in New York State"

In 1998, the New York Department of Public Service commissioned a study from Arthur Anderson and Associates as a contribution to ongoing deliberations in that state regarding the foundations for a competitive electric market[119]. The report modelled various scenarios with the object of drawing comparisons between the costs and benefits of a "competitive" metering scenario in which interval capable meters could be provided to end-use customers on a voluntary basis and "wide-scale" provision of interval capable meters to all customers by the Utility Distribution Companies (or UDCs).

The scenario for "wide-scale" metering assumed that the metering system would:

- record consumption hourly and retrieve it daily
- be deployed within five years
- be installed and operated by a vendor under contract with the utility

The scenario also assumed that the technology employed would be a fixed radio frequency network and that 70% of the existing meters would be able to be retrofitted with the radio frequency module, with the remaining meters replaced. Vendors were polled to attain current market prices for components and installation services.

These costs were then estimated to be:

Component	Cost
Module	US$40
Retrofit and Installation	US$16
New Meter	US$25

The "all-in" cost for metering residential and small commercial customers with this system was judged to be US$2.50/month.

The report also analysed a scenario where competitive metering services were offered to customers on a voluntary basis. The analysis assumed that the technology employed would be a Dual-Tone, Multi Frequency system which uses a shared telephone line to communicate meter data to an independent Energy Service provider. These equipment costs were then

119 The report is available at http://www.dps.state.ny.us/esco_metering.html

estimated as appropriate to use in the analysis, with the market assumption that 2% of all residential and small commercial customers would participate and that 70% of existing accumulation meters would be adaptable to retrofitting with communication modules:

Component	Cost
Module	US$60
Retrofit and Installation	US$35
New Meter	US$25

The analysis also assumed that meter reading and operation and maintenance costs for the system would approximate US$15 a month for each customer. The 20 year Net Present Value of the direct and indirect incremental costs required to install and operate such a system were judged to be $2,800 per customer.

"A White Paper on direct access metering and data communications requirements"

In 1998, the National Association of Regulatory Utility Commissioners (NARUC) commissioned a report from Plexus Research, Inc. that addressed the state of metering and meter data communications requirements to support direct access in the electricity market, with the objective of supporting informed decision-making by US regulatory bodies as electricity markets restructured.[120] The report also studied costs and benefits of metering all sites versus costs for dynamic load profiling.

While detailed analysis was not provided in this document regarding system component costs, nor was there supporting attribution regarding sources for cost information, the document refers to *"quotes to utilities by providers of automated meter reading (AMR) systems capable of supporting hourly metering" as providing a basis for the cost analysis*".[121] The paper states that *"(t)he initial non-recurring cost to instrument every customer with a meter capable of providing hourly meter readings, delivered daily, is about US$100 when they are deployed in high volume. This cost includes the meter and its installation, and the communications infrastructure for data retrieval and management. We are focusing on residential metering in this discussion because most large sites already are equipped with hourly metering, and residential technologies are suitable for many small commercial sites*."[122]

Assumptions of the analysis of load profiling data in the report were based on "*recent submissions by California utilities in response to orders by the California Public Utility Commission.*"[123] The report paper found that, beyond the initial non-recurring cost to establish profiling capability which was estimated to be US$23, the monthly costs to collect the data

120 The report is available at http://www.naruc.org/Resources/docs/metering/Metering.htm
121 White Paper on Direct Access Metering, p. 43
122 ibid.. 43
123 ibid p. 44

and process it are similar for directly metered and load-profiled sites – on the order of US$1 to US$2 a month. Beyond this:

> *"The load profiling approach has a continuing cost that the hourly metering approach does not have: The load profiles must be frequently updated to assure their accuracy as the customer population changes. Major utilities have recently estimated load research and analysis costs from US$1 million to US$6 million to create complete new sets of load profiles, depending on how many classes are to be created. On a per-customer basis this equates to about US5 cents to US25 cents per customer per month. For approximately double this cost, the load profiling can be 'dynamic'. That is, each day new data can be collected and a new profile calculated to support settlement reflecting that day's weather, economic conditions, etc."*[124]

In summation, costs per customer for metering and profiling are determined to be:

	Initial Non-recurring Cost	**Monthly Operating Cost**	**Monthly Load Research Cost**
Metering	US$100	US$1 - US$2	none
Profiling	US$23	US$1 - US$2	US$0.10 - US$0.20

124 ibid p. 44

APPENDIX C - ELECTRICITY RESTRUCTURING IN THE EUROPEAN UNION[125]

European Parliament Directive 96/92/EC

European Parliament Directive 96/92/EC - which establishes common rules for the internal market in electricity, and for generation, transmission and distribution of electricity - was adopted by the Council of Ministers on 19 December 1996 and entered into force on 19 February 1997. Member States had two years to implement the laws, regulations and administrative provisions necessary to comply with this Directive. Belgium and Ireland had an additional one year and Greece an additional two years to transpose the Directive.

Generation

For the construction of new generating capacity, Member States may choose between authorization or tendering procedures or mixes of the two procedures. Whatever procedure is chosen it must be conducted in accordance with objective, transparent and non-discriminatory criteria. The difference between the two procedures is that:

- In the tendering procedure the Member State sets up an inventory of the need for future generating capacity, including the demand for electricity, based on estimations carried out by the transmission system operator or any other competent authority designated by the Member State.
- In the authorization system, applications that conform with the criteria for granting an authorization should be authorised. Lack of demand is not a valid reason for refusal. Authorisation procedure

Transmission

Member States designate or require transmission system owners to designate a system operator (TSO) to be responsible for operating, ensuring the maintenance and if necessary developing the transmission system in a given area and its interconnectors with other systems in order to guarantee security of supply.

The TSO is responsible for dispatching generators in its area and for determining the use of interconnectors with other systems in an open, objective and non-discriminatory manner. The criteria for despatch must apply economic merit order. A Member State may, however, require the TSO to give priority in the dispatching to electricity produced from renewables, waste and from combined heat and power; and priority can also be given to electricity produced using indigenous fuels up to 15% of the annual primary energy necessary to produce the electricity consumed.

[125] http://europa.eu.int/en/comm/dg17/elec/memor.htm

Distribution

As in the case for transmission, a system operator must be allocated responsibility for operating, ensuring the maintenance and if necessary developing the distribution system in a given area and its interconnectors with other systems in order to achieve a secure, reliable and efficient electricity distribution system.

A Member State may also impose on distribution companies an obligation to supply customers located in its area. The tariffs may be regulated, e.g. a requirement to sell electricity to all private consumers at equal prices per kWh in its area via the imposition of a public service obligation.[126]

Unbundling

The aim of unbundling is to avoid discrimination, cross-subsidization and distortion of competition. Integrated electricity undertakings are required to keep separate accounts for their generation, transmission, distribution and non-electricity activities. Member States or any competent authority have right of access to these unbundled accounts. The annual accounts have to be published.

Access to the network

Member States can choose between negotiated or regulated third party access or the single buyer procedure when organising the access to the transmission and the distribution network. Both sets of procedure must operate in accordance with objective, transparent and non-discriminatory criteria.

- **Negotiated Third Party Access** (TPA) allows contracted producers and consumers to negotiate access to the network with its operator and agree transport tariffs and other conditions. The system operator may refuse access in case of lack of capacity and has no obligations to construct new capacity. In case of refusal duly substantiated reasons must be given, in particular having regard to the public service obligations.

  Member States must designate an independent competent authority to settle disputes between the parties, including in case of refusal of access. It shall also be ensured that none of the parties abuse an eventual dominant position

  System operators must publish indicative prices (average prices over 1 year) for the use of the transmission and distribution systems. The Commission publishes available prices for all Member States on its Internet site.

[126] Public service obligations allow Member States to balance competition with public services, where this is deemed necessary in the general interest of the society. Examples include an obligation for a distributor to supply all customers in its area at equal price, or an obligation for customers to purchase a certain percentage of electricity from renewables. However, they should not be used to favour domestic electricity producers at the expense of producers in other Member States.

- **Regulated Third Party Access** allows contracted producers and consumers a right of access to networks on the basis of published tariffs. Independent dispute resolution processes apply as for Negotiated TPA.
- **A Single Buyer** is responsible for management of the transmission system and/or for centralized electricity purchasing and selling. This means that the single buyer would normally also be the transmission system operator but not necessarily. The single buyer system is characterised by powers and protections aimed at maximising opportunities for producers and consumers to agree on the terms and conditions of energy supply so as to achieve the same economical result as regulated TPA.

Direct lines (Inset or Bypass)

All producers and suppliers have, subject to objective and non-discriminatory authorisation, a right to supply their own premises, subsidiaries and eligible customers through a direct line. Member States may, however, make authorization subject to the refusal of system access (lack of capacity of the transmission and/or distribution network) or to the opening of a dispute settlement procedure, and may refuse authorisation of a direct line that obstructs public service obligations.

Market opening

The Directive provides for a compulsory, gradual (but minimum) market opening in three steps. The Member States are allowed to go for a further opening, including a complete liberalisation and many are choosing to do so.

Tranche	Commencement Date	Load Threshold	Proportion total load
1st step	19 February 1999	>40GWh	26.5%
2nd step	19 February 2000	>20GWh	28%
3rd step	19 February 2003	>9GWh	33%

Member States define the eligible customers but must publish definitions by 31 January each year. However, consumers >100GWh, and distributors must be included in the definition of eligible customers.

Reciprocity

Directive contains some possibilities of refusing access for customers from other Member States when the Member State itself opens a larger part of the market than the other states (e.g. if a customer is eligible in Member State A but not in Member State B).