Market Trading Working Group Position Paper No. 1

MARKET OVERVIEW

NATIONAL GRID MANAGEMENT COUNCIL

MARKET TRADING WORKING GROUP

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1. Background

The Council of Australian Governments (COAG) meeting in Darwin on 19 August 1994 requested the National Grid Management Council (NGMC) to report on the interim market arrangements to apply from July 1995 and specified the broad objectives for the market (Appendix 1). The proposed trading arrangements outlined in this paper have been developed in accordance with those objectives.

The Market Trading Working Group has looked at a number of competitive electricity market models, taking into account experience from overseas and from within Australia where competitive models have been trialed or introduced, as well as from the NGMC's own market "Paper Trial" which was completed earlier this year.

The scope of this paper is to provide an overview of the market model proposed for the national electricity market in Australia. It addresses the trading arrangements (both contract and spot),the settlements process, the physical operation of the system and system security issues. It also provides a discussion of proposed transitional arrangements concerning the introduction of the competitive market model. The paper does not address in any detail a range of other important factors in the development of the market such as : the franchise customer limit, vesting contracts, network pricing, industry structure and competition policy issues which are matters for separate government consideration.

The paper, and the proposals in it, are the result of considerable input and debate from a wide cross-section of sources. The Working Group has drawn on the broad-based representation and expertise of its members with valuable input from a range of other experts, and has considered the findings of the Market Trial Audit report prepared for the NGMC by Ernst & Young (Appendix 2). Input has also been obtained from members of the Reference Group which includes representation from generators, grid owners/operators, distributors, system operators, large customers, Commonwealth and State Government officials and the Trade Practices Commission.

2. Overview Of Proposed Trading Arrangements

The proposed wholesale trading arrangements for the national electricity market cover three areas which provide a wide range of instruments so that participants varied needs are fully accommodated :

- *a long term bilateral contract market* - where customers, retail suppliers and generators have the choice of a wide range of contractual arrangements into which they may enter.

- *A short term forward trading market* - where participants (both generators and customers) can trade contracts, 1 to 2 days ahead of actual dispatch, to fine tune their contractual and spot exposures and better manage risks.
- *A spot market* - where the spot price is based on generator and dispatchable load bids and is calculated on an ex-post (after the event) basis. This market effectively enables participants to trade overs and unders, based on actual generation/demand on the day of operation, at a single pool price for each half hour.

Any contestable customer, retailer or generator may be a participant in the wholesale market, subject to requirements set out in the Industry Code of Conduct. Contestable customers (those greater than some specified size, expected to be not more than 10MW) will have a choice of participating in the wholesale market or not.

Briefly, the trading options of the wholesale market are as follows :

Long Term Trading

- The market will cater for any form of trading between buyers and sellers (eg. between suppliers and contestable customers) including, for example, direct energy contracts, contracts for capacity and energy, and hedging about spot prices.
- Subject to national competition laws, the details of these contracts may be kept confidential. The parties may net out part or all of such arrangements from spot trading by notifying the pool that nominated settlements credits and invoices for one party are to be reassigned to the other.
- The trading arrangements are compatible with the potential development of a futures market in electricity.

Short Term Forward Trading

- To assist scheduling and allow participants to adjust their positions in the market, for the initial market short term (two and one day ahead) forward trading will be facilitated by the pool.
- Short term forward trading to fine tune contractual positions is entirely optional and participants may choose not to use this feature. However, it helps participants to lock in their plans leading up to the day of actual generation and use, based on any better information available to them at that time.
- Short term forward trading allows customers to exert more influence in the market and allows generators to more carefully manage risks associated with their plant commitment decisions.
- In the forward trading market, participants (both generators and customers) would offer buy/sells around their initial contracted position (if any). The market manager (pool) would then stack all the buys and sells and determine (from the intersection of the buys and the sells) a common clearing price. Any trades below that would then be deemed to have taken place and participants would end up with adjusted contract positions at a price they were willing to trade. Settlement of these forward trades would occur (along with spot market settlements) some time after the day of operation.

- The form of the bids in the forward trading market needs to be on a half hourly basis, so that participants can match their contracts with desired/expected profiles on the day of operation. The buy/sells for the 48 half hour periods would all be bid at the same time.
- In the medium term, it is expected these short term trading arrangements will evolve into a more sophisticated short term forward market as participants gain experience and confidence. It is anticipated it could ultimately provide for continuous trading from up to a week or more ahead through to only hours before the actual time of dispatch.

Spot Trading

- The spot clearing price is intended to reflect the actual conditions prevailing during the trading period. It is set by the next increment of generation or demand to enter or exit if the supply/demand balance changes. It is intended that it will be calculated on a half hour basis as close as possible to real time and disseminated for participants at large to respond to if they wish.
- A centralised dispatch facility is proposed for both generation and dispatchable loads. In general it will load plant in merit order based on simple price, quantity buy/sell offers after taking transmission constraints into account. Transmission losses and plant rate of change constraints will also be considered.. Decommitment will be market driven, based on dispatch bidding.
- Generators and dispatchable loads submit simple price, quantity bids for bands of energy relating to notional or physical units at a specified site. For convenience, participants can elect to use default provisions which will allow carry over of bids from previous trading.
- The primary purpose of spot trading is to clear the market and it is critical the price in this market is allowed to rise to the level necessary for the market to clear. even though at times this will result in considerable price volatility.

2.1 Retail Trading - Opting Out Of The Pool

In addition to the wholesale trading options outlined above, customers may choose to have no direct interaction with the pool and the wholesale market, and instead purchase a retail supply contract. There would be no constraints on the sort of commercial arrangements that could be made between buyers and sellers in the retail market. They could for example look very similar to existing tariff style arrangements or they may separate network service payments from energy payments. Contestable customers would have choice of retailers and would expect competitive pressures to deliver better service, as well as keener prices.

2.2 System Operation and Security

After the forward trading market has operated and generators (and potentially demand blocks) have indicated their commitment decisions, which have been checked for technical adequacy, participants will be asked to indicate their dispatch bids to the central market operator. The physical dispatch is then done in bid price order by the system operator. If the generators manage their own commitment,

the dispatch bid functions can be very simple - simple $ per MWh increments for the day which are used to create a single "merit order" stack for dispatch purposes. Participants would submit their commitment schedule and buy/sell bids around that position. This would enable them to be backed-off if another participant can generate energy more cheaply, or raised in output if another generator is more expensive. This gives a clear economic signal for appropriate changes in the generation schedule.

Features of the system operation are as follows :

- The principal concern of the system operator is the secure operation of the power system.
- Generators will schedule their own unit commitment, based on their own view of the market. All plant is treated the same and each generator accepts the cost of putting plant in service and the financial risks associated with market based dispatch. Similarly, any preparations undertaken by demand side participants will be their own responsibility. Participants will notify the pool of such commitments.
- The technical envelope will be checked by the system operator taking into account his/her own demand forecast and assessment of reserve capabilities, given the commitment schedules locked in by participants in the forward market. The system operator will keep the state of the system under review and provide a service by alerting participants if there are any perceived system security risks, and requesting them to amend their bids/commitment schedules to overcome the problem.
- Ultimately as a last resort, should market mechanisms fail to provide an adequate level of system security, the system operator would have the power to intervene in the market and direct participants to comply. This latter course of action would be subject to detailed requirements in the Code of Conduct, and a "regulated" pool price would apply. (Supply emergency only).
- On the day of operation, the system operator centrally dispatches generation and dispatchable loads and takes control in times of emergencies.
- The system operator will procure ancillary services to enable safe and reliable operation of the system. Contestable contracts will be used to the extent that they are suitable.

2.3 Network Factors

Access to the network must be non-discriminatory and provide no barriers to the operation of the competitive market.

In the event of network constraints, various regions of the national market may clear at different spot prices (due to the fact that the spot price is set by the marginal generator or dispatchable load on each side of the constraint). The proposed market model includes mechanisms to manage risks to participants caused by the network constraints. For example.

- One promising option being considered is that of interconnector insurance - a financial instrument which would guarantee compensation to a participant for a difference in regional pool prices.

As well as providing an appropriate risk management facility, such market mechanisms would indicate the value of augmenting the interconnector.

2.4 Settlements

There is intended to be a single pool settlements function for energy trading with the pool. Network settlements between network owners is a separate issue and is not covered here.

- The main purpose is to settle all the forward trades and the spot trades with the pool - normally, all the trades balance such that the pool pays out to sellers exactly what it bills to buyers.
- In the absence of any other instructions from participants, all energy which flows through the pool will be traded with the pool.
- Participants may notify the pool that certain credits/invoices are to be reassigned from one to the other. The reassignment may be for a simple monetary amount or for a time sculpted amount of energy. The overall result is that participants may net out their bilateral trading from the spot market so that they remove themselves from any spot trading for the contracted quantity.

3. Discussion Of Issues

The original impetus for a National Electricity Market arose from the perception that the centrally planned industry had failed to achieve the maximum attainable economic efficiency. Particular scope for improvement was seen in the area of long term investment: electricity is a capital intensive industry with assets in Australia of around $40 billion.

The proposed trading arrangements therefore lay emphasis on increasing economic efficiency through competition, particularly in relation to long term investment.

In making the proposals outlined in this paper, the Market Trading Working Group is conscious of the need for a conservative, evolutionary approach to the national market, which takes into account initial inexperience with market mechanisms and the need to carefully manage risks, especially in the short term.

The following discussion outlines some of the issues considered in the development of the proposed market model.

3.1 Initial Market Contestability

Although the proposed reduction over time of the franchise customer limit is a separate issue from the specification of the market model, it is useful to make a few observations on market contestability and the transition to a fully competitive market.

The purpose of a staged introduction of competition is to manage financial risks and to allow a staged development of the necessary metering, communication and settlements infrastructure. With this in mind, on 19 August 1994 COAG agreed in relation to customer market thresholds that :

a) The move to a competitive electricity market by 1 July 1999 include an agreed timetable for the progressive reduction in the threshold level for competitive customers;

b) At the commencement of the transition phase on 1 July 1995, competitive access be allowed by each State at least for customers of 10 MW; and

c) The NGMC report back to the Council's February 1995 meeting on both the timetable to reduce competitive customer thresholds over the transition period and the arrangements that should apply from 1 July 1999.

Several points are worth noting :

- The NGMC had previously based the technical threshold criteria on a customer's peak electricity demand; however there are several reasons why an annual energy consumption threshold may be more practical. It may be preferable therefore that customers be contestable if they exceed the existing 10 MW limit or some new energy based threshold, which is yet to be determined.
- In determining which customers are eligible to participate in the market, the current view is that the threshold must be reached at a single site, ie. aggregation over multiple sites is not allowed. However, further work is required on this.
- The timetable for the reduction of the contestable threshold is being developed by individual jurisdictions. However, there would be value in a degree of uniformity on the timetable in terms of the sizes and dates.
- Linked to the customer eligibility issue is the level of vesting contract cover and the timetable for their phasing out.

All of these issues are being considered by jurisdictions at this stage. However achievement of a 1 July 1995 commencement date requires early resolution of these matters.

3.2 Long Term Trading

It is anticipated the bulk of energy will be covered by long term bilateral contracts between buyers and sellers in the market and vigorous long term trading in electricity is likely to be a key factor in delivering more efficient investment decisions. The proposed arrangements are designed to support a very broad range of contractual instruments suitable either for direct bilateral trading or for trading through an exchange. Participants' expressed trading needs and preferences should be fully accommodated and the usual commercial confidentiality can be preserved. Appendix 2 outlines the needs of market participants which have been addressed in the development of the market model.

3.3 Short Term Forward Trading

Forward trades could have been allowed any time ahead of actual dispatch and usage. The closer one gets to the actual time of dispatch, a participant will have progressively better information on his actual requirements to trade in the forward market. However, some market participants must plan and operate within constraints which impact beyond a day or more. For example, some generation technologies take longer than one day to start-up and hence they may not be able to fully manage their commitment risks. Demand participants (eg. large industries) may need to lock in their production scheduling more than a day ahead and they may wish to fully hedge against price risks in the ex-post spot market.

Whilst in the longer term a more sophisticated forward market may be necessary, it was considered that allowing for both a 2 day ahead and a 1 day ahead trading round initially (combined with participant access to optional information and support services) would be practical to implement and would probably provide sufficient opportunities for all forms of participants to trade into a satisfactory position before the actual day of dispatch and thereby manage their risks appropriately.

3.4 Spot Trading

Electricity is generated on a just-in-time basis; no economic storage is currently available. The proposed trading arrangements therefore include a spot market based on the shortest practicable trading period: half an hour. Its primary role is to ensure that supply and demand are efficiently balanced in each trading period.

A second very important function is to provide appropriate investment signals. A sustained upward trend in spot prices should eventually trigger movement in long term contract prices and ultimately evoke suitable supply or demand side investment responses. Sporadic volatility in the spot market should induce interest in options contracts and, eventually, investment in peaking plant or demand management.

The calculation of spot prices could be done on an ex-ante basis (before the event) or an ex-post basis (after the event). The advantage of calculating spot prices in advance is to give signals to participants so they can respond accordingly. However, because actual demands and actual generator availabilities are not known, estimates and approximations must be utilised, including "uplift" to take into account uncertainties. Ex-post pricing does not have this limitation and with an ex-ante forward market, there appears to be a clear case for the proposed ex-post spot market (as described earlier).

For simplicity, it is preferable to keep any "uplift" to the spot price to a minimum and, if possible, eliminate it altogether. In this way, on the day of operation, demand varies from half hour to half hour and the marginal spot price varies accordingly.

3.5 System Operation and Security

Generating units have traditionally been committed according to a centrally determined schedule. Scheduling algorithms can be exceedingly complex and may nevertheless not produce optimal outcomes. It is potentially simpler and more in accord with a market oriented approach to leave commitment decisions to individual participants. For this to be effective however, other mechanisms

such as short term trading and information exchange facilities need to be provided so as to enable efficient overall coordination of participants' intentions to be achieved through market forces.

Generators will make a commercial decision to start-up their generator and bring it into service, based on the following factors :

- their long term contract position;
- any short term forward trades already locked in or which are able to be done over the next day or so;
- their latest forward outlook for pool prices in the spot market over the days ahead.

The generator should not bring the plant into service if it would be more profitable to buy in the ex-ante forward market or the spot market to meet contractual commitments, rather than operating itself.

As well as facilitating unit commitment, these mechanisms are expected to be equally effective in eliciting and coordinating other participant responses. For example, demand side participants would be able to improve their scheduling of production processes and water pumping or heating. Participants can also adjust their positions around long term contracts in the light of current information and requirements.

With respect to system security, it is to be expected that when the market reaches maturity, the market itself will operate in such a way that all the participants will respond to the economic signals both in the short and long term and that the market will clear of its own accord without the need for intervention by the system operator. While the operator will retain full accountability to operate the power system on the day in accord with the accepted rules and standards, it will not have to intervene unless there is a major emergency event.

To encourage the market to work efficiently, the system operator will have an important facilitating role in that it will collect, analyse and disseminate a considerable amount of information to keep the market participants informed about the current state of the system and future outlooks over periods ranging from a day or two ahead to years ahead.

3.6 Network Factors

All energy traded in the National Electricity Market will be transported through a common network - a finite resource subject to constraints and losses. It will be important to the success of the market for the network's finite resources to be utilised optimally.

This is particularly true in relation to transmission between States. Efficient utilisation of the interconnectors will be essential if barriers to interstate trade in electricity are to be minimised.

The proposed trading arrangements are founded on the principles that access to the network should be competitive and non-discriminatory. Participants should bear the impacts of any side effects of their usage of the network and network-related risks should be allocated to those best able to manage them. The trading mechanisms should help reveal appropriate network investment and maintenance strategies. Long term bilateral interstate trading may be unnecessarily inhibited if participants cannot hedge the financial risks associated with interconnector constraints.

A consequence of network constraints is that the pool will collect revenue whenever the interconnectors cause regional pool price differentials. Such revenues are clearly network-related and can in fact be attributed to specific sections of the network. They should therefore be quarantined and earmarked for network-related purposes - for example, dealing with hedging financial risks in trading across interconnectors. Hence, the development of the proposal for insurance against regional pool price differences (up to the capacity of the relevant interconnectors) may be attractive.

3.7 Settlements

After the day of operation, Settlements would determine how much each participant actually generated or consumed (from metered quantities). It would also determine for each participant, how much electricity was traded at spot price, how much was covered by forward trading and how much was netted out of the spot trading by notifications supplied to the pool by participants.

Settlements accounts would then be forwarded to each participant for forward trading and spot trading. Bilateral contract trading (either direct or hedging) would not be settled by the pool.

The settlements period could be daily at one extreme or monthly at the other. The advantage of a shorter period is that it returns financial flows to generators as quickly as possible and the advantage of longer periods is that it retains financial flows with customers as long as possible. On balance, a weekly settlements period, cleared one month after the day of operation seems a sensible compromise, but further work is required to finalise this level of detail.

3.8 Market Information Needs of Participants

It is envisaged that market information needs will cover several time scales. In the long term, the Statement of Opportunities published by the NGMC or its successor will provide participants and potential participants with information relevant for longer term investment decisions. This will be augmented by long term trends in pool price and participants expectations which will be reflected in contract prices and quantities. In the short term, participants will need a wide range of market information on expected commitment (say weekly and/or daily), proposed dispatch (daily), ex-ante forward trading prices (daily in advance), ex-post spot prices, total demand and generation (daily after the event). In addition, individual participants would require data on their own metered quantities for reconciliation of settlements statements and for short term planning and trading.

4. Transitional Issues

The introduction of a national competitive electricity market will have major repercussions for the electric utilities, their Government owners and their customers. The impact of competition between generators and also between retailers is expected to bring lasting benefits, particularly for customers. However, it will also introduce much greater uncertainty for individual utility businesses which will need some time to acquire the new skills they will need and learn to operate effectively with well planned risk management strategies suited to the new market environment.

In addition, the market model being proposed, although similar in concept to other commodity markets in place around the world, has not been applied in exactly this form to electricity trading elsewhere.

For these reasons an evolutionary approach to the introduction of the competitive market should be adopted. New market mechanisms should be tested and refined prior to introduction or else be backed up by other mechanisms during a proving period.

An effective procedure for modifying the market's rules and arrangements should be put in place at the time of the initial market implementation.

In a mature market one would expect to see appropriate long term investment, a rich and diverse range of resources to clear the market (both generation and demand management) particularly at times of high pool prices, and an appropriate level of system security. However, initially, there may need to be some augmentation of market mechanisms to ensure that inexperience or market immaturity does not lead to inappropriate market failures. These facilitated mechanisms would be phased out over time and it is intended that they would only operate as a last resort. The following sections outline some options for the transition period.

4.1 Short Term System Security

During the transition period, it is proposed the system operator retain some accountabilities to oversee the operation of the market with the authority to intervene, using market mechanisms where possible, to minimise the possibility of avoidable, involuntary load interruptions.

Forward information as to the overall contract position in the market is very useful input to the overall assessment of the short term system security position. Therefore, during the transition period, it is proposed all market participants advise the pool of their long term contracted quantities some days ahead of the short term trading rounds. This information is likely to be provided willingly by most parties (on a confidential basis) anyway because it can then be excluded from the spot transactions in settlements.

To ensure sufficient operating reserves are available, a multi-stage process is envisaged. Initially, it is proposed that a "Reserve Trader" will monitor the level of available reserves, and alert the market of any perceived shortfall. Generators would then be encouraged to start-up by the expectation of high pool prices and customers would be encouraged to demand manage. If this did not produce adequate responses, the Reserve Trader would intervene in the short term forward market to purchase extra reserves for resale at spot time, to avoid involuntary load shedding (if at all possible).

4.2 Transitional Investment

In the first few years of a National Market, there is likely to be considerable uncertainty as to how the market will behave in the medium and long term. There may be an initial reluctance to enter into long term investments until market trends become clearer.

Thus it is possible that in the early years market forces alone may not deliver adequate investment to ensure system reliability in the medium to long term.

In the first instance, this should be addressed through a process of facilitation. For example, a central body might conduct and publish analyses of projected supply, demand and network trends such as the NGMC's "Statement of Opportunities". An independent body might be commissioned to initiate a futures market in electricity.

Such measures may well stimulate an adequate market response. However for an interim period, a safety net may be needed in the form of a mechanism for last-resort central intervention. Any intervention would need to be even-handed and limited in scope and duration so as not to unnecessarily distort the market. Some options are under consideration.

4.3 Value of Lost Load (VoLL)

In order to give the correct market signals, it is important for the spot price to be allowed to approach realistically high values when load is being involuntarily shed This should stimulate participants to enter into arrangements that limit their financial exposure to VoLL. In so doing, they should ultimately evoke supply or demand side measures that reduce the physical risk of load shedding occurring.

However in an immature market, allowing the spot price to approach a very high VoLL may expose inexperienced participants to catastrophic financial risks. A temporary capping of VoLL may therefore be expedient.

4.4 Decentralised Scheduling

The efficacy of decentralised scheduling mediated through short term forward trading and information exchange should be tested in market simulations prior to implementation. Although it works satisfactorily in Norway - a hydro-based system, it has yet to be trialled in a system supplied by large thermal generating units.

If adequate advance testing is not feasible, some optional central scheduling assistance should probably be included for a limited period, if desired by participants.

4.5 Network Losses and Constraints

Further work is being conducted to define the extent to which consideration of network losses and constraints should progressively be incorporated into the trading arrangements and the appropriate mechanisms for so doing.

4.6 Demand Side Participation

An active and deep participation of the demand side is essential for the future market operation. Participants will need to see price signals and be able to react to them. Initially, such demand side participation may be slow to develop and may need to be incentivised in the early years. Further work is being done to explore options to facilitate investments in this important area.

5. Evaluation In Terms Of Market Objectives And Participant Expectations

COAG specified some broad objectives for the market in August 1994 (see Appendix 1). The recommended model is consistent with these objectives.

Eligible customers will have complete freedom of choice as to which supplier, including generators, retailers and traders they trade with, and a wide range of contractual instruments will be supported.

Access to the interconnected transmission and distribution network will be truly competitive and non-discriminatory. Physical power flows are determined by the best priced bids and offers from any source, subject to normal system security requirements.

No legislative or regulatory barriers to the entry of new participants are introduced. The need to actively facilitate such entry through the dissemination of outlook information and other mechanisms is acknowledged.

The market model will ensure fair competition between inter and intra State trade throughout with appropriate consideration of transmission losses and constraints and provision for managing the related risks.

The overall goal of increasing economic efficiency in the Electricity Industry through competition is also addressed through:

- an emphasis on trading and scheduling mechanisms that promote active competition and are non-discriminatory; and
- compatibility with a wide range of contractual trading instruments, ensuring that participants' varied needs are fully accommodated.

The proposed market model is considered to satisfy the expectations of market participants as detailed in Appendix 2. In essence, participants have a wide range of market mechanisms to facilitate trading. If a customer wants a very simple arrangement without exposure to spot prices or involvement in the forward market, that can be arranged. If another participant prefers to manage his risks by fine tuning his contract cover from time to time in the forward market, then that can also be accommodated. If a customer would rather have a level of exposure to the spot price because of a highly manageable load shape, then that is also possible. Each participant has complete flexibility in his/her choices (see Appendix 3).

The proposed market mechanism takes an evolutionary approach with an orderly transition as the market matures.

Appendix 1: Market Objectives

At the Council of Australian Governments Meeting in Darwin on 19 August 1994, the Council once again reaffirmed its commitment to the progressive introduction of competitive electricity market arrangements.

In particular, the Council agreed that:

a) the interim market trading and pool arrangements from 1 July 1995 within and between States should be consistent and standardised to the extent necessary to ensure that retailers and eligible customers can freely trade with generators throughout the interconnected system, but recognising the different stages of reform which may exist in each jurisdiction at that time.

b) the main objectives of the fully competitive national market operating from 1 July 1999 are:-

I. the ability for customers to choose which supplier, including generators, retailers and traders, they will trade with,

II. non-discriminatory access to the interconnected transmission and distribution network,

III. no discriminatory legislative or regulatory barriers to entry for new participants in generation or retail supply, and

IV. no discriminatory legislative or regulatory barriers to interstate and/or intrastate trade

c) transition arrangements are to be developed on the basis of the earliest practicable achievement of the objectives of the fully competitive market.

The overall objective of the market reform is to establish an open market for the supply and purchase of electricity, where trade is as free as possible and investment decisions can be taken having regard to prices which are competitively determined.

In its most recent report to COAG in August this year, the NGMC proposed an expanded set of more detailed principles for a competitive market as listed below. The proposed trading arrangements are consistent with these principles.

1. The development of electricity market arrangements should encourage the economically efficient and environmentally sound development of the entire national energy sector.
2. Deregulated end-use customers (those not covered by franchise arrangements) and retailers, are to have freedom of choice as to their supplier, from both inter and intra-State, and the form of supply arrangements.
3. The "market" is to allow for both contract and spot trading. Any contract trading can be administratively separate from the spot trading function.

4. All participants are to have equal opportunity to bid into the market and set the spot clearing price.
5. Contractual arrangements can be as varied as participants desire.
6. Subject to system security needs, market arrangements are to encourage economic efficiency in both new investment in the industry and in its day to day operation.
7. Market arrangements are to cater for the progressive reduction of customer franchises, the extent and rate of reduction to be agreed by the relevant Governments. Any retained franchise customer base may carry any obligations to supply as defined by relevant Governments.
8. Non-discriminatory access to the grid (transmission and/or distribution networks as appropriate) for generators, retailers and end-use customers able to trade under these arrangements is to be guaranteed.
9. Use of grid fees and connection charges are to be cost reflective, based on common asset valuation methodologies and maximum rates of return, and applied in a simple, consistent and transparent manner.
10. Deregulated end-use customers, generators and retailers are to be free to enter the market subject only to meeting any licence, pool fees, prudential requirements and any limits on interstate trading imposed by State Governments during the transition period.
11. Means whereby participants interact with the pool and grid are to be as simple as possible to ensure ease of access.

Appendix 2: Needs Of The Market Participants

London Economics Survey

The Commonwealth Department of Primary Industries and Energy engaged London Economics to evaluate the NGMC Market Trial. As part of that evaluation, London Economics surveyed trial participants for their views on the trial and electricity reform in general. Some of the key findings of that survey were :

- The key determinant of a competitive market in the view of customers and to a lesser extent distributors, is a trend towards lower prices. Other factors such as choice of supplier and trading arrangements were given next greatest significance. However, the success of the competitive market will be judged by customers as the extent to which benefits are passed on in lower prices.
- Overall, most respondents thought that the benefits of establishing a competitive national electricity market would outweigh the costs, although generators were more optimistic about this than were customers or distributors.

ACIL Economics and Policy Customer Needs Analysis

In addition, ACIL Economics and Policy conducted an analysis of customer needs using its Customer Paper Trial Trading Centre. ACIL made several key recommendations :

- The transition process should involve a high level of customer participation, in line with expectations developed during the trial.
- The national market must include direct customer access to the generators and distributors of their choice.
- The pooling system needs to be made simpler and more predictable. At the same time, customers want the ability to influence pool prices and to be assured there will be sufficient competition.

Business Council of Australia Views

The Business Council's vision for the Australian Electricity industry is for :

"An industry which is able to use Australia's natural advantages in fossil fuels to deliver electricity at prices which add leverage to Australia's competitive position, based on :

- competitive generators, both within each State and between States;
- separated transmission systems;
- competitive generators/energy supply companies;
- maximum customer choice in products/services and suppliers; and

- major customers able to organise their own electricity supply."

The Business Council's specific requirements in relation to the trading system include :

- a trading system which would allow capacity and energy contracts to be negotiated directly between generators and customers;
- prices to be determined based on direct negotiations, with participants able to arrange their own settlements;
- access to a spot market either to off-load surpluses or to supplement contract supplies;
- much simpler systems for power pooling/trading than in England & Wales;
- customers and generators free to use whatever contractual forms they desire; and
- a clear requirement for a national market rather than separate jurisdictional markets.

Generator and Distributor Views

Both generators and distributors have substantial capital invested in fixed assets, and are concerned that their financial obligations will be able to be met in the transition to a competitive market. They are also concerned that the market arrangements will allow the industry to adopt risk allocation arrangements which will be acceptable to all participants.

Both sectors are also concerned with the extent to which they are required to carry an obligation to supply in the future market, given that they may not have any secure long term retail counterpart.

Some generators have also raised the issues of long term supply reliability and short term system security in a competitive market , both of which may be less certain in any move away from a centrally planned electricity system.

Appendix 3: An End Customer's Role In The Market

The first decision that an end customer eligible to trade in the national electricity market will need to make is whether he/she wishes to be totally insulated from pool trading and not operate in the wholesale market. If so, the customer will need to negotiate a suitable retail supply arrangement with a supplier, who could be any participant in the market (generator, retail supplier, broker, etc). This retail supply contract could be of any form (including tariff style contract with incentives to limit load under certain conditions), but the supplier essentially takes on all responsibilities for the customers' load (including any overs/unders from the contracted quantity since the customer is not a pool participant).

Alternatively, the customer could choose to be a player in the wholesale market and enter into a direct contract with a supplier for a quantity of load. In this case, the two parties may choose to notify settlements so that the supplier assumes responsibility for the agreed amount of the customer's load (ie, netting out of pool bills). In this case, the customer, as a pool participant is still responsible for any unders/overs from the contracted quantity at the prevailing pool price (unless he/she trades this exposure on the forward market).

If the customer has decided to retain some exposure to pool trading, he/she could proceed as follows :

- Estimate long term expected electricity needs and if desired, negotiate contracts for some or all of it. The contracts can be bilateral or through a futures exchange, if a futures market for electricity emerges over time. As above, settlements credits and invoices for contracted energy can, if the supplier agrees, be reassigned to that party.
- Closer to the time of use (but presumably prior to 2 days before), needs and price trends can be reassessed and if desired, extra energy can be purchased or some contracted energy sold back through bilateral or futures trading.
- One or two days ahead of use, similar adjustments can be made by trading through the forward market. For example, on the basis of prices then prevailing, it may prove profitable to adjust the scheduling of electricity-intensive processes (ie. plan to reduce demand).
- At the actual time of use (spot time) the customer may optionally adjust his/her consumption in the light of prevailing spot prices. For example, if consumption is reduced at a time when the spot price is very high, some contracted energy is effectively sold back at a profit.

Note that provided the customer's actual consumption matches his/her long term contracted position, there is no exposure to the short term forward price or the spot price. However, if he/she is flexible enough to be able to alter consumption over the timescales involved (one or two days for forward trading, or hour by hour for spot trading) there may be opportunities for the customer to increase his/her profits.

Any energy purchase or sales not covered by settlements reassignments will be settled through the pool, with possibly some direct payments between the customer and supplier(s). Other purchases would be settled directly with the supplier(s) concerned.

A numerical example of a possible set of trading arrangements for a particular half hour, follows :

Example : Trading Arrangements for a Particular Half Hour

The example has two generators G1 and G2 and three customers C1, C2 and C3.

- G1 has 400MW of capacity, G2 has 100MW of capacity
- C1 load is expected at 120MW, C2 load is expected at 190MW, C3 load is expected at 50MW

1. Long Term Contracts

- G1 has a 100MW contract to supply C1 at $40/MWh
- G1 has a 200MW contract to supply C2 at $35/MWh
- G2 has a 50MW contract to supply C3 at $45/MWh

2. Forward Trading Market

- G1 offers to sell 100MW at $52/MWh or buy 300MW at $20/MWh
- G2 offers to sell 50MW at $56/MWh or buy 50MW at $25/MWh
- C1 offers to buy 20MW at $55/MWh
- C2 offers to sell 10MW at $40/MWh
- C3 offers to sell 50MW at $50/MWh

By stacking buys and then sells the only trades that are satisfied are:

- C1 buys 20MW, C2 sells 10MW, C3 sells 10MW all at a clearing price of $50/MWh

The total contracted position now is:

- G1 total of 300MW
- G2 total of 50MW ... for a generation total of 350MW
- C1 total of 100+20=120MW
- C2 total of 200-10=190MW

C3 total of 50-10= 40MW ... for a total customer contract level of 350MW

3. The Ex-post Spot Market

- G1 bids to sell 100MW at $50/MWh or buy 300MW at $20/MWh
- G2 bids to sell 50MW at $45/MWh or buy 50MW at $25/MWh
- The loads that turned out on the ex-post were: C1 load = 130MW, C2 load = 200MW, C3 load = 50MW ... for a total system load of 380MW
- The dispatch schedule was specified as: G1 scheduled to 300MW (i.e. its contracted position), G2 scheduled to 50MW + 30MW (as its contracted position plus the lowest cost offer to match demand).
- The Pool price for this half hour is = $45/MWh

4. Centralised Settlements

4.1 Ex ante Trades

The Pool charges :

- C1 for 20 MW at $50/Mwh

The Pool pays:

- C2 for 10 MW at $50/Mwh
- C3 for 10 MW at $50/Mwh

There are no payments or charges for either G1 or G2.

4.2 Ex post Spot Trades

The Pool Charges:

- C1 for 130MW - 120MW = 10MW at $45/MWh
- C2 for 200MW - 190MW = 10MW at $45/MWh
- C3 for 50MW - 40MW = 10MW at $45/MWh

The Pool pays :

- G2 for 30MW at $45/MWh
- There are no payments or charges for G1

5. Total Payments/Charges including Bilateral Trading:

- C1 100MW @ $40 Contract 20MW @ $50 ex-ante 10MW @ $45 ex-post
  Totals 130MW at a total of $2,725 ($41.92/MWh)
- C2 200MW at $35 Contract -10MW at $50 ex-ante +10MW at $45 ex-post
  Totals 200MW at a total of $3,475 ($34.75/MWh)
- C3 50MW at $45 Contract -10MW at $50 ex-ante +10MW at $45 ex-post
  Totals 50MW at a total of $1,100 ($44/MWh)

The total of all customers charges is $7,300

- G1 100MW at $40 Contract 200MW at $35 Contract
  Totals 300MW at a total of $5,500 ($36.67/MWh)
- G2 50MW at $45 Contract 30MW at $45 ex-post
  Totals 80MW at a total of $1,800 ($45/MWh)

The total of all generator payments is $7,300