

Generator Market Power and Bidding Rules in Wholesale Markets

Address to the Conference: Energy Regulation and the Role of the Regulators

by Alan Moran

Electricity and gas as commodities

The electricity and gas markets are fundamentally commodity markets.

But they differ from other commodity markets in two major respects:

- First the producers have massive mutual interest in the delivery system being maintained in a safe and reliable manner. It is not usually practicable for firms or individuals outside of remote areas to opt out of the network in either gas or electricity. And even where it is possible the parties undertake strenuous efforts to avoid it. Gas in Australia is something of an exception since until recently there were bilateral monopolies operating in both Victoria and NSW with only one producer and one retail/distributor.
- Secondly, the lack of storage of electricity in particular means the suppliers and consumers need to cooperate far more closely than this is required in other commodity markets.

As a result of these differences, the electricity and gas markets did not evolve in the same way as other commodity markets. Other commodities established markets spontaneously and developed trading rules organically without any government oversight beyond the normal provisions of law. The high degree of natural monopoly in the delivery system marks out gas and electricity as different. Both electricity and, to a lesser degree gas, were either taken over and run by governments or heavily regulated.

Other commodities avoided this. Not only do merchants in other commodities trade on a spot delivery basis with little concern about the means of delivery itself but they have developed future delivery product mechanisms (which we now call derivatives). And they did this with remarkable efficiency: we seldom hear about a crisis in rubber or oil seed or wool or tin. The only occasions, aside from in wartime, when supply disruption has occurred is those mercifully rare incidents when producer cartels have successfully operated. This has been confined to two brief periods with oil.

The Electricity Code

While other commodity markets evolved, the electricity and gas markets have been devised by governments, although early models had evolved particularly in PJM where a meshed system and many suppliers had made it convenient for a cooperative

framework to develop autonomously. This cooperation, and ceding of powers to a central body is essential because not only does the system have a high degree of commonality in transport, but the fragility of that transport medium means it must be constantly monitored and its users subject to central dictates.

The Code is an attempt to set detailed rules and the code change process and policing by NECA is a means by which the rules are refined. The Code itself largely set out the mechanisms in place in the previously integrated system whereby the different components had to be organised for delivery to the consumer. The major difference is a more prominent role of price in establishing which units were to be scheduled but in principle that role was already embedded within the integrated utilities.

The Code Change mechanism has introduced dozens of refinements to the original. These include:

Gazette Notices

Dispute resolution arrangements (11 April 2002)
Network and distributed resources (8 March 2002)
NSW full retail competition derogations (7 March 2002)
Prudential Arrangements: Security Deposits (21 February 2002)
Full Retail Competition (20 December 2001)
NSW full retail competition derogations (20 December 2001)
Network pricing and market network service providers (6 December 2001)
Averaging of transmission loss factors (1 November 2001)
Extension of Queensland Technical Derogations (25 October 2001)
End-user advocacy et al. (11 October 2001)
Victorian Full Retail Competition Derogations (6 September 2001)
Further Extension to Chapter 9 Ancillary Services Arrangements (23 August 2001)
Full Retail Competition and Registration of Code Participants (16 August 2001)
Ancillary services (9 August 2001)
Victorian Full Retail Competition Derogations (31 July 2001)
Extension of derogation - Snowy Hydro Trading Pty Ltd (26 April 2001)
Pricing under extreme market conditions (22 February 2001)
Basslink (1 February 2001)
VoLL, Capacity Mechanisms and removal of the price floor (25 January 2001)
VoLL scaling (25 January 2001)
Changes to Queensland derogations (25 January 2001)
Rebidding and revision of settlement statements (21 December 2000)
Introduction to Goods and Services Tax (21 December 2000)
Inter-regional transfer of TUOS charges and the treatment of losses (21 December 2000)
Extension to chapter 9 ancillary services arrangements (14 December 2000)
Full retail competition (30 October 2000)
NSW Derogations for interim transmission network service pricing (13 October 2000)
Third tranche Code changes - Queensland ramp rate amendments (20 July 2000)
Introduction of GST (29 June 2000)
Capacity Mechanisms (29 June 2000)
Market network service providers (further clauses) (16 March 2000)
Third tranche Code changes (2 March 2000)
NSW network pricing derogations (25 February 2000)
Trading limits; funding of compensation for system security directions; intra-regional loss factors (24 February 2000)
SA derogations; settlement residue auctions (3 February 2000)
Y2K withdrawal; Queensland Market Network Service Provider derogations (13 January 2000)
NSW derogations - regulation of network assets (23 December 1999)
Removal of zero price floor (13 December 1999)
Market network service providers (21 October 1999)
Removal of Queensland rebidding restrictions (23 September 1999)
Intra-regional loss factors; SA derogations (15 July 1999)
Transmission pricing arrangements in NSW (1 July 1999)
Settlements residue auction; SA derogations; interim ancillary services arrangements (28 June 1999)

In addition several are before the ACCC awaiting their review. These include

Proposed Code changes forwarded to the ACCC

Review of technical standards: interim extension of existing derogations
Code Change Panel: review of directions in the national electricity market
Code Change Panel: stage 1 of integrating the energy market and network services
Generators' bidding and rebidding strategies and their effect on prices: revised proposals

In addition, the rules are clarified as a result of particular cases being adjudicated. The best illustration of this is the recent decision taken in the National Electricity Tribunal concerning bidding in NSW at the time of a system constraint. On that occasion Macquarie bid its output on a "must run" basis. This meant it could not set the price but would be assured of a large market share. "Must run" is designed to allow for

situations where a plant is in difficulties or at a testing stage. In other cases generators bid price/quantity bands. In the recent case, Delta, having been squeezed out by Macquarie's actions, then adopted a similar approach and other suppliers were left producing less than they expected or less than would have been the outcome if normal price/quantity bidding procedures had applied. This sort of bidding overrides the normal dispatch and, if maintained for long periods, would bring inefficient market behaviour.

In the event Macquarie was found to be at fault and paid a modest fine. The case itself was more useful in clarifying when certain provisions can legitimately be used. It also illustrates the very large difference between the electricity commodity market and other commodities where suppliers need to accept disciplines but can also agree to allow privileged treatment for particular forms of supply under certain conditions.

Evidence of Generator Market Power

California is on everyone's lips when issues of generator market power are addressed. And relatively recent material coming out of Enron has indicated a few ways where a clued-up generator could manipulate that market through using market power in special circumstances and make money in ways that were not envisaged and in some cases impose costs. These were given colourful code names by the traders like "death star" and "get shorty". I'll come to these strategies a little later.

In terms of the detailed examinations of the market, tracing the causes to exercises of market power has not generally been found to be the main problem. Certainly Joskow and Paul Kahn¹ say they have found evidence of strategic withholding which drove the prices higher for three of the eight or nine very high priced months. Scott Harvey and William Hogan² say they could not detect withholding of power and go on to argue that measures designed to prevent this are likely to be arbitrary and to deter new investment.

Moreover, as Frank Wolak has pointed out³, there is a major ambiguity. On the one hand, the US Federal Power Act requires prices to be "just and reasonable" and FERC has decreed that prices which reflect unilateral exercise of market power are not "just and reasonable". On the other hand, US anti trust law, like our own Trade Practices Act, does not regard such action, which we sometimes call "gaming", to be illegal. Indeed, a firm is required to maximise the wealth of its shareholders and if it does not set prices that maximise that value it is actually operating contrary to company law! But the shared nature of the network means that rules over and above those set in other commodity markets must be in place. These rules prevent some forms of

¹ Joskow, P.L., and Kahn E., *A quantitative analysis of pricing behavior in California's wholesale electricity market during summer 2000*, National Bureau of Energy Research Working Paper 8157, 2001

² Scott M. Harvey and William W. Hogan *On The Exercise Of Market Power Through Strategic Withholding In California*, Center for Business and Government Harvard University Cambridge, 2001

³ see for example Wolak F., *Is price gouging really the problem?*, San Diego Tribune July 27 2001

gaming and specify behaviour in much the same sort of way that rules of the road work.

The causes of the Californian meltdown were clearly a mixture of

- bad luck (like the NZ counterpart of a 100 year water famine);
- plus NIMBY powers to prevent new plant and transmission line building;
- possibly price suppression at the retail level; and
- poor design of the market (like the inability to forward contract and the ability to self schedule without regard to transmission constraints)

It is poor market design that we can best focus upon in this setting (leaving politics to dissuade governments from acting foolishly in response to populist cries.

Some of the strategies Enron used to make use of the rules and operate in unintended ways included:

- Inc-ing. Seeking to get a higher price by manipulating the self schedule, increasing its load schedule but not taking the whole amount and thereby obtaining a higher price where there was a load deficit. Actually this is only possible because there were two markets, with the imbalance market being a ten minute market. It could not occur like this in Australia where there is only one market - essentially the five minute gross pool and its linked ancillary service markets. Also the activities were actually market stabilizing since they arbitrated price differences, thereby levelling them. Similar activities occurred by forward selling ancillary services and going short on them buying them
- Taking advantage of transmission constraints to gain payment for phantom energy sent in the opposite direction of a transmission constraint
- exporting energy and re-importing it. This is a strategy that undermines the price cap put in place in California (and is to be commended!)

Much of this was possible only because the Californian market was a net pool in some respects. Importantly, a net pool under which firms need only inform the market manager of the sales made other than those off-market is likely to present difficulties where there are transmission constraints and Enron took advantage of these.

ABARE's January paper, *Competition in the Australian national electricity market*, examined spot price outcomes in Australia and concluded that there were deviations from competitive outcomes. The knee-jerk reaction of those in the industry would be, "Tell us something new, wholesale spot prices in NSW and Victoria in the past four years have averaged \$31 per MWh compared to a long term expected rate of \$40." But the deviations ABARE had in mind were high not low prices!

The average prices in the four main markets are illustrated below.

Average Prices in Major National Electricity Markets (\$)				
Year	NSW	VIC	QLD	SA
1999 J-June	23.7	25.1	55	49.7
1999 - 2000	28.9	26.1	45.3	60.6
2000 - 2001	38.4	45.4	42.2	57.3
2001 J-Dec	27.4	26.7	28	26.4

The ABARE paper likens the outcome in Australia to Joskow's analysis of California that attributes high prices there to generator gaming.

The best test of claims that generators are driving up prices would come from an examination of their share prices. Unfortunately most Australian generators are either government owned or not listed. Loy Yang is the exception and, as one of the largest energy suppliers in Australia, is a decent bellwether for the industry in general. Loy Yang's shares are trading at less than a quarter of their issue price, while its debt too is selling in secondary markets at a steep discount. This is not the sort of outcome that might be expected of a firm that is exercising monopolistic powers or benefiting from such activity by other firms.

And while Delta and Macgen had pre-tax earnings of \$188 million and \$143 million last year, these are modest earnings for firms worth \$3-4 billion.

ABARE's analysis also suggests the exercise of market power to be more prevalent in Victoria than in Queensland. Understandably, the authors find this outcome to be surprising. Victoria, as the table above shows, has with NSW generally experienced the lowest prices in the national market. It also has the least concentrated generation supply. ESAA data shows the four major brown coal generation businesses had 90 per cent of Victoria's generation market in 2000 and that there were five other significant suppliers. In contrast, Queensland at the time of the study had four state owned generation businesses supplying 99.5 per cent of generation.

University of Maryland Professor Tim Brennan has addressed the methodology, the Lerner index, used in the ABARE study⁴. The Lerner index is the price minus the marginal (or average variable) cost divided by the price. In a perfectly competitive market, the index, measured as that of the last generator despatched to meet the energy demand, it is equal to one. In other words, the last supplier is bidding its marginal cost, (which can be very high if capacity is reached). ABARE estimate the marginal costs of each supplier, add 50% to this, and designate all bids above that level to indicate the generator has and is exercising market power.

⁴ Timothy J. Brennan, *Checking for Market Power in Electricity: The Perils of Price-Cost Margins*, IPA.

Professor Brennan criticises the index as it applies to electricity generation on a number of grounds. He maintains that use of marginal cost as the appropriate bid level does not explain how the generator's fixed costs are met. He says,

“...when one is trying to discover what the (short-run) competitive price would be in a market where capacity is limited, one would not compare price to the average variable cost of the marginal plant In a simple model .. the peak price over the long run would equal that highest average variable cost plus the average capacity cost of the plant. The actual level of the on-peak price in the short run would be above or below this value, depending on whether demand was higher or lower than that expected when the unit was constructed.

These are among the issues that Stephen Littlechild has addressed in recent paper⁵. Professor Littlechild took vigorous steps to combat monopolistic market power when he was the UK electricity regulator. However he warns against the authorities placing price restraints on firms to prevent them bidding above the marginal costs. In a world of great uncertainty regarding rainfall, demand and many other changes, he says,

“ .. it would be commercial suicide for a generator to assume that the market will always be in equilibrium and that it should price at marginal cost. The world is too risky for that. Investment in new plant is very expensive and typically takes a long time to recover. The entrant must reduce its risks and plan to get its investment back as soon as possible. It will do this by a variety of long term and short term contracts to allocate risk to those parties best able to control them – which will typically include fuel suppliers and equipment manufacturers as well as retailers and customers.

“ .. in the real world, competitive markets generally are not characterised by price equal to marginal cost. That is the wrong benchmark for judging possibly anti-competitive behaviour. Life is more complex and in particular more risky than the marginal cost criterion recognises.”

Professor Littlechild addresses the implications of this for regulatory policy. He argues that if a regulator were to impose a penalty on a firm even for withholding capacity (let alone for bidding a price bid above short run marginal cost) this may have a disincentive effect on potential new generation, exacerbating later problems.

Market power is an elusive concept. Almost all businesses in all markets enjoy some ability to raise prices by offering less. Many firms promote differences, often trivial differences, in their brands in order to improve prices. Others may find niches within markets in which they can, at least temporarily, charge higher prices than the basic costs would seem to justify. Still others find themselves in a fortunate position of having supply available that is insufficient to meet demand—perhaps because of a competitor's sudden failure, perhaps because of an unanticipated upsurge in demand.

⁵ Stephen Littlechild *Electricity: Regulatory Developments Around the World*, The Beesley Lectures on Regulation Series XI, IEA/LBS, London 9 October 2001 (Revised version 12 November 2001)

Although there may be grumbles about “profiteering” in some such circumstances, actions to prevent the higher prices will normally rebound against the consumer’s interest. Without the ability to charge very high prices to cover rare events, firms may have inadequate incentives to operate so that they have capacity available at the right time. In addition, these very high prices act as a means of rationing supply to those placing the greatest value on it (we normally refer to this as demand side participation).

The ABARE paper is correct when it concludes the task is to identify underlying causes of noncompetitive outcomes and determine whether mitigating market power delivers sufficient cost benefits. The trouble is that their analysis has produced a straw man—while many of us would like to see more disaggregation of generation, the evidence does not point to monopolistic abuse in the market structures we have.

Combating Market Power

Fears of market power are endemic. But examples on a major scale are difficult to find. Shylock in the Merchant of Venice was able to extract highly onerous terms for a futures contract with Antonio and was only swindled out of his Pound of Flesh by an artful lawyer. Antonio was, of course, a highly risky supplier and Shylock had market power as the last man left standing who would offer to supply a futures contract to him. Obtaining high prices for the most marginal supply is essential if that supply is to be remunerative and therefore available.

Those sort of circumstances could equally well bankrupt a supplier (a generator) in today’s electricity market in the same way as they ruined Antonio in the Merchant of Venice. This is avoided by contracting and by ensuring that prices are seen by the customers or their agents so that they can react (or their agents react on their behalf) to very high prices. Abandoning retail competition or suppressing price levels is counter-productive to this.

More generally we have seen the apparent market power of the two major UK generators lifting prices to well above the levels expected by the regulatory authorities, moves that have brought, in part, their own cure with the construction of considerably more capacity. The solution in avoiding the losses stemming from market power is to ensure that there are plenty of competitors. But even then, it is likely that there will be episodes of very high prices, just as there were episodes of blackouts in the past.

The new UK variant (NETA), seeks to offset market power by paying the generator the price it is bid; most other variants pay the price bid by the marginal supplier to all suppliers. There is something to be said in auction theory for both approaches, though the UK approach requires considerably more investment in information technology systems. And it is the structure of competition rather than the bidding

system that provides the market power, a matter demonstrated in a report by Wait, commissioned three years ago by the ACCC⁶.

In reality, however, all electricity markets are fundamentally contract markets (an exception was the failed Californian model where contracts were largely forbidden). In Australia, the best guess is that 95 per cent of energy is bought under contract. The reason for this is the strong risk aversion of retailers (and their financial backers) to high price excursions. The spot market (or, in the UK, the balancing market) is therefore a market for “unders and overs” which settles the small amount of energy that was despatched and used without a contract cover.

Some markets incorporate a capacity payment to encourage high cost capacity to be made available. While this has ostensible appeal for a market with variable demand, it also involves a central planner determining what capacity level should be made available and how much to pay for it. In my view the energy only market works better⁷ though, as with other market design issues, the matter is not settled.

The exercising of generator market power in the UK market was doubtless the reason for changing to the NETA. The UK had tried to have the generators agree to a Statement of Ethics but the MMC threw the requirement out. We had our own counterpart to this. But it withered from lack of support was probably doomed anyway once the UK decision was made.

At the heart of the more recent attempts to address the matter has been provisions for re-bidding. Some initial thoughts were:

1. that rebids three hours prior to dispatch may only be made if there are legitimate production or cost reasons;
2. that initial bids must reflect the generator's intent; and
3. that the price changes in any single period should be dampened by not permitting increases from one five minute period to next to exceed \$1,000.

Following meetings and discussions these became:

- require generators' bids and rebids to be made in good faith and therefore represent their genuine intentions at the time they are made.
- accompany this by a shift in the onus of proof so that in any proceeding a generator would be required to satisfy the National Electricity Tribunal that its bid or rebid was genuinely made in good faith; and
- prohibit bids or rebids that have the purpose, or have or are likely to have the effect, of materially prejudicing the efficient, competitive or reliable operation of the market.

Regarding the concerns that generators are able to ramp up spot prices by shifting load, the dimensions of issue include:

⁶ Waite, A. *Electricity pool market arrangements: should e NEM adopt a gross or net pool?*,

⁷ See Peter Hartley and Alan Moran, *Marginal Costs and Prices in the Electricity Industry*, by IPA June 2000 <http://www.ipa.org.au/pubs/Moranwebpapers/Energy15.pdf>

- The original market did not envisage bids being changed except under special circumstances and the residual impact of this can still be seen in the provision which does not permit firms to change their prices on the day but only to shift quantities;
- And the possibility remains that a firm could engage in ‘anti-social’ activity that imposes costs on rivals, for example by an erratic bidding approach that forces rivals plant on and off with unwanted frequency. The market and system is so tightly integrated that this ability of a player to act in a renegade manner needs to be constrained.
- But market experience and developments have shown:
 - the spot market is a residual market not the envisaged main market
 - the planned day ahead market has developed into a dynamic five minute ahead market which is far more efficient in allowing bids to reflect the physical and market exigencies very close to dispatch
 - constraining prices also prevents firms taking action that will effectively lower price by impeding the bringing forth of additional supply; this is true both of firms that are energy limited and seeking to ration the supply to the occasions where prices are highest (i.e. those when it is most highly valued); and those firms simply seeking to get into the action to take advantage of a commercial opportunity. Both NECA and the consultants examining the issue recognised that re-bids normally bring lower prices than originally set.
- In any event the premium prices, if any, resulting from the activity are precisely those needed to encourage more capacity to be brought on stream. Some argue both that we should stop prices moving up and that we need more new plant than the market is presently creating. This is possible only by a total abandonment of the competitive market and a return to central planning.

This aside, issues are clouded by a lack of certainty over just what constitutes reasonable behaviour. Few would now claim that the rebidding we have combined with what is essentially a five minute market, should be jettisoned. But many would place constraints, to a greater or lesser extent on the activity.

For their own part, the generators adopt an ambivalent approach. Some claim rebidding is done only in reaction to changes of circumstances. Others argue that it is an essential stabilizer to ensure the conservation of scarce resources especially for energy limited firms. Still others argue that rebidding and activity like parking load at bids above \$5,000 per MWh is a legitimate strategy designed to force up prices. Such activity is immensely facilitated by the notorious ETEF system in NSW whereby 80% of the weekend load is uncontracted; generators can then bid much of their capacity at high prices knowing that they will not be caught short in the event of a price spike.

Those who are seeking to force up prices are, outside NSW, seeking to encourage retailers to enter into contracts and would point to the very low prices that have long

prevailed. They would respond to accusations that they are using market power with a shrug. It is, they would say, our generation capacity and like every other producer of goods and services we want the best possible price.

Now I have some sympathy with this view, since it is anchored on property rights and action that involves raising prices is self-correcting—it draws in additional supplies and brings about changed customer behaviour. It may however give rise to policy reactions. This is particularly so in the situation in NSW where the relatively small number of suppliers has always offered the prospect of an unhealthy exercise of market power. The government mandated retail arrangements have severely aggravated this and the best solution is to tackle these the underlying causes: that is abandon the market stifling ETEF situation and further disaggregate generation in NSW.

These are just the more important matters exercising people's minds in the wholesale electricity market. Doubtless we do not yet have the optimum set of rules but the market continues to emerge and the great many variations on the basic theme will continue to inform us as to what changes might best be made.