Potential Effectiveness of the Demand Curve Approach for Mitigation of Local Market Power in Capacity Markets

Department of Market Monitoring

October 11, 2007

I. Background

If California moves forward with a centralized capacity market design, it is critically important that it be structured to provide sufficient safeguards against the exercise of local market power. The need for local market power mitigation may be significantly lessened by a capacity market design that provides a strong incentive for investment in new resources and allows potential new investment to compete to meet capacity requirements. However, the CAISO's Department of Market Monitoring (DMM) has noted that within many local areas, it may be inefficient or insufficient to rely on competition from potential new resources to mitigate the market power of existing suppliers. Within these local areas, significant barriers to entry may also exist that are difficult for the market monitor to assess. For these reasons, DMM believes that any proposal should include additional provisions to explicitly mitigate local market power, and should avoid over-reliance on entry of new capacity in load pockets.

The most detailed capacity market proposals which have been submitted by various parties incorporate two distinct alternatives for the mitigation of local market power that may be exercised through economic withholding:

- The demand curve approach based on New York ISO's capacity market desing, proposed by Constellation[1] and Mirant;[2] and

- The direct bid mitigation approach based on specific structural, conduct and impact tests, proposed by the California Forward Capacity Market Advocates (CFCMA).[3]

As noted in previous comments on these proposals, DMM's initial assessment of these approaches is that the direct bid mitigation approach proposal provides a significantly greater level of protection against local market power.[4] This paper provides a more detailed explanation and analysis of DMM's concerns with the NYISO-style demand curve approach proposed by Constellation and Mirant.[5]

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[1] See http://www.caiso.com/1c32/1c32bf5838de0.pdf (Constellation).

[2] See http://www.caiso.com/1c32/1c32bdc92b940.pdf (Mirant).

[3] See http://www.caiso.com/1c32/1c32ba981c0e0.pdf (CFCMA).

[4] *Initial Comments on Capacity Market Proposals: Market Power Mitigation*, Department of Market Monitoring, September 14, 2007, http://www.caiso.com/1c59/1c59f04237820.pdf

[5] Some of the concerns about the NYISO-style demand curve approach illustrated in this paper could be lessened by modifying this approach to include strong provisions to prevent economic and physical withholding. However, such modifications have not been proposed by Constellation in response to comments provided on their initial proposal, and a detailed discussion and analysis of such modifications is beyond that scope of this paper. A short discussion of such modifications is provided in the final section of this paper.

II. Analyzing Local Market Power Under a NYISO-Style Demand Curve Approach

Proponents of the demand curve approach contend that the downward sloping nature of the demand curve – combined with the upper bound on demand curve pricing – provides a safeguard against market power (Constellation, p. 15). Specific parameters proposed for use in the demand curve for California's market are not provided in the proposals of Constellation or Mirant. However, Constellation's proposal cites demand curves currently used by the New York ISO (NYISO) as examples of what demand curves might look like (Constellation, p. 16). Therefore, the demand curves examined in this analysis are derived from the same key parameters of demand curves currently used in NYISO. Specifically, the basic scenario used in this analysis is based on the following demand curve parameters:

- A net Cost of New Energy (CONE) of $92/kW year.[6]
- A maximum price cap equal to 1.58 times the value for net CONE ($145/kW).
- A slope or elasticity of the demand curve corresponding to a demand curve with an x-axis intercept (where price = $0) equal to 118% of the local capacity requirement.

The base scenario assumes that the net going forward fixed costs (GFFC) of the existing generation of the largest supplier is zero, reflecting an assumption that net annual operating revenues from this capacity would equal or exceed their annual GFFC. However, sensitivity analysis is performed under the assumption of net GFFC for existing generation of $16/kW/year.

The potential effectiveness of demand curves reflecting these various parameters in mitigating local market power was assessed for three major load pockets in the CAISO system:

- San Diego
- Western Los Angeles Basin (Western LA Basin)
- San Francisco Bay Area (Bay Area)

For each of these local areas, the potential for local market power is examined based on information provided in CAISO's 2007 and 2008 *Local Capacity Technical Analysis* studies regarding the following:

- Total capacity needed to meet local capacity requirements;
- Total supply of capacity available to meet local capacity requirements (including the Qualified Capacity for each unit posted by the CAISO in conjunction with the *Local Capacity Technical Analysis*); and
- The portion of available supply owned or controlled by the one or two major suppliers within each area (based on the Qualified Capacity for each unit posted by the CAISO, combined with the known owner of each unit)

[6] This value corresponds to the net CONE for the New York ISO system. In practice, the NYISO develops different demand curves for each month based on these annual values. However, for simplicity, this analysis was based on an annual demand curve derived from annual net CONE. This approach also reflects Mirant's recommendation that the CAISO adopt a demand curve approach on an annual rather than monthly basis.

As illustrated in the following sections of this report, the potential for local market power can be examined in two ways:

- The profitability of unilateral market power by suppliers who are individually pivotal; and
- A simple Cournot model of potential duopolistic market outcomes in areas such as the Bay Area, where two major suppliers each own a relatively large share of the available supply.

Results of this analysis suggest that the demand curve approach is likely to be insufficient to effectively mitigate local market power within the major load pockets within the CAISO. It should be noted that the potential bidding behavior and market outcomes shown in the following section of this paper are derived from hypothetical models of market behavior and conditions which assume each major supplier fully exercises local market power in order to maximize its capacity market revenues. In practice, it is possible that market participants may not fully exercise this local market power for a variety of reasons, including concern that such behavior might violate FERC market rules or be subject to other regulatory responses.[7]

III. Results of Analysis

San Diego Area

Unilateral market power exists when a single supplier can significantly raise the Market Clearing Price (MCP) by *physical withholding* (not bidding capacity), and/or *economic withholding* (bidding significantly in excess of actual costs so that capacity does not clear the market). Although a supplier may be able to increase the MCP through physical or economic withholding, the supplier may not have an incentive to withhold unless it is profitable to do so. The supplier must earn a higher profit by withholding a portion of its supply, and selling a lower quantity at a higher price. If it is profitable for a supplier to withhold, the supplier has both the ability and incentive to exercise market power.

In the context of a capacity market based on the demand curve approach, the potential for unilateral market power can be directly assessed by calculating the profit maximizing amount of capacity that a supplier would offer, given the following information:

- The administrative demand curve, and;
- The residual supply that may be offered by other suppliers.

Within the context of the type of year ahead or month ahead capacity auction proposed by Constellation and Mirant, both the demand curve and potential residual supply would be known

[7] For example, as a result of concerns about the exercise of market power in the New York ISO's capacity market for New York city, FERC recently directed its Office of Enforcement to open and investigation of a specific large market participant in that market.

with a very high level of certainty.[8] Thus, under these conditions, the potential for unilateral market power can be easily assessed using a simple spreadsheet model.

The current local capacity requirements and available supply within the San Diego area, as provided in the CAISO's 2008 *Local Capacity Technical Analysis*,[9] are summarized in Table 1. As shown in Table 1, the available supply of capacity in San Diego is approximately equal to the 2008 local capacity requirement in this area. The largest supplier in the San Diego is NRG, which owns about 38% of the available supply.

Table 1. Local Capacity Requirements and Available Supply San Diego Area

San Diego Area Requirement	2,957 MW
San Diego Area Supply	
NRG	1,133 MW (38% of supply)
Dynegy	702 MW (24% of supply)
SDG&E	777 MW (26% of supply)
Other Suppliers	335 MW (12% of supply)
Total Sub Area	2,959 MW (100% of requirement)

Figure 1 illustrates the unilateral market power of the largest supplier in San Diego (NRG) in terms of the residual demand curve that is assumed to face the supplier in this analysis, or the amount of the supplier's capacity that would clear the local capacity auction at various market clearing prices. This residual demand curve represents the overall demand curve for capacity in the San Diego area used in this study, less the portion of this demand that could be met by the residual supply controlled by all other suppliers within San Diego. As shown in Figure 1:

- The residual demand for capacity owned by the largest supplier is inelastic (at the price cap of $145/kW/year) for up to about 800 MW of the supplier's 1,113 MW of capacity.

- For sales above about 800 MW, the residual demand curve for the largest supplier's capacity slopes downward, reflecting the downward slope of the overall demand curve used in the capacity auction.

- If the largest supplier offered all of its capacity at or below the net cost of new entry ($92), all of the supplier's capacity would clear the auction, with the market clearing at net CONE of $92/kW/year.

Figure 2 shows the capacity market revenues earned by the largest suppliers for different levels of sales. As shown in Figure 2, the largest supplier maximizes capacity market revenues by making sales of about 830 MW, at which level the MCP for capacity would still clear at the price

[8] For example, while the residual supply that may be offered by other suppliers may not be known with complete certainty, the maximum residual supply that could be offered would presumably be known with virtually complete certainty in a year ahead or month ahead capacity auction, since all capacity bidding in the auction would have to be installed or very near completion.

[9] http://www.caiso.com/1bb5/1bb5ed3d46430.pdf

cap of $145/kW/year. As shown by the dotted lines in Figure 2, these results are not significantly affected by the assumption of the supplier's net going forward fixed costs (i.e., $0 or $16/kW/year).

Figure 3 depicts the profit maximizing level of sales by the largest supplier in terms of the overall demand curve and level of potential supply in the local capacity auction. As shown in Figure 3, under a scenario where the largest supplier maximizes profits by exercising unilateral market power, the volume of total capacity clearing the auction equals 2,650 MW, or only about 90% of local capacity requirement.

Figure 1. Residual Demand Curve Facing Largest Supplier - San Diego Area

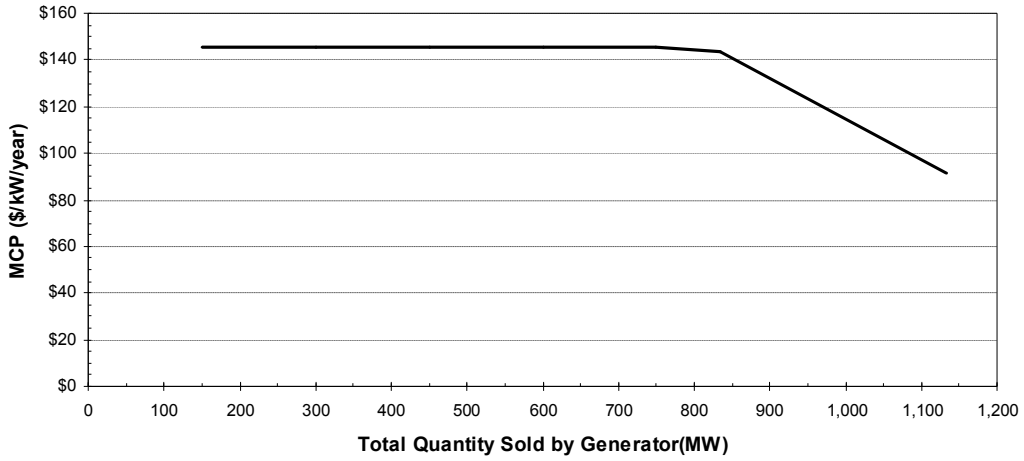


Figure 2. Profit Maximizing Level of Capacity Sales for Largest Supplier San Diego Area

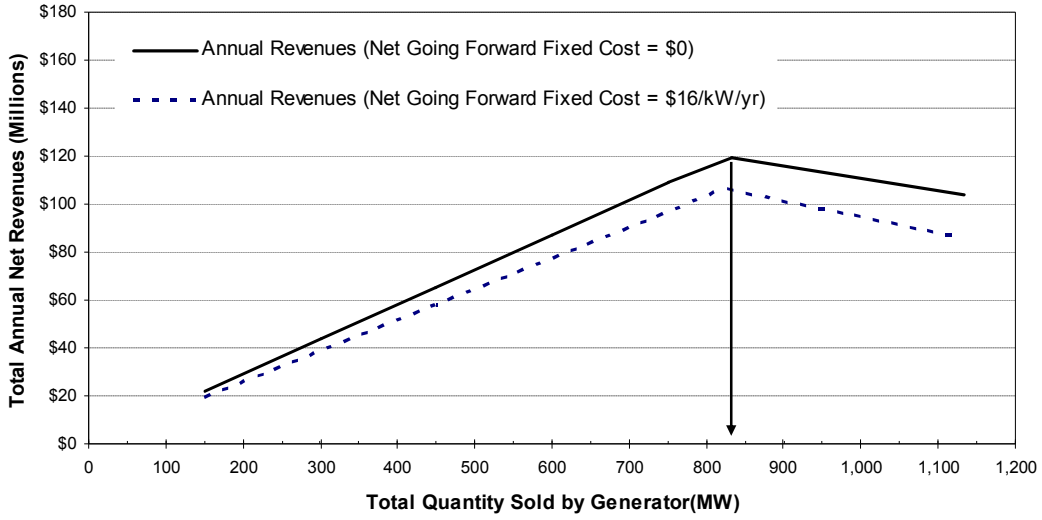
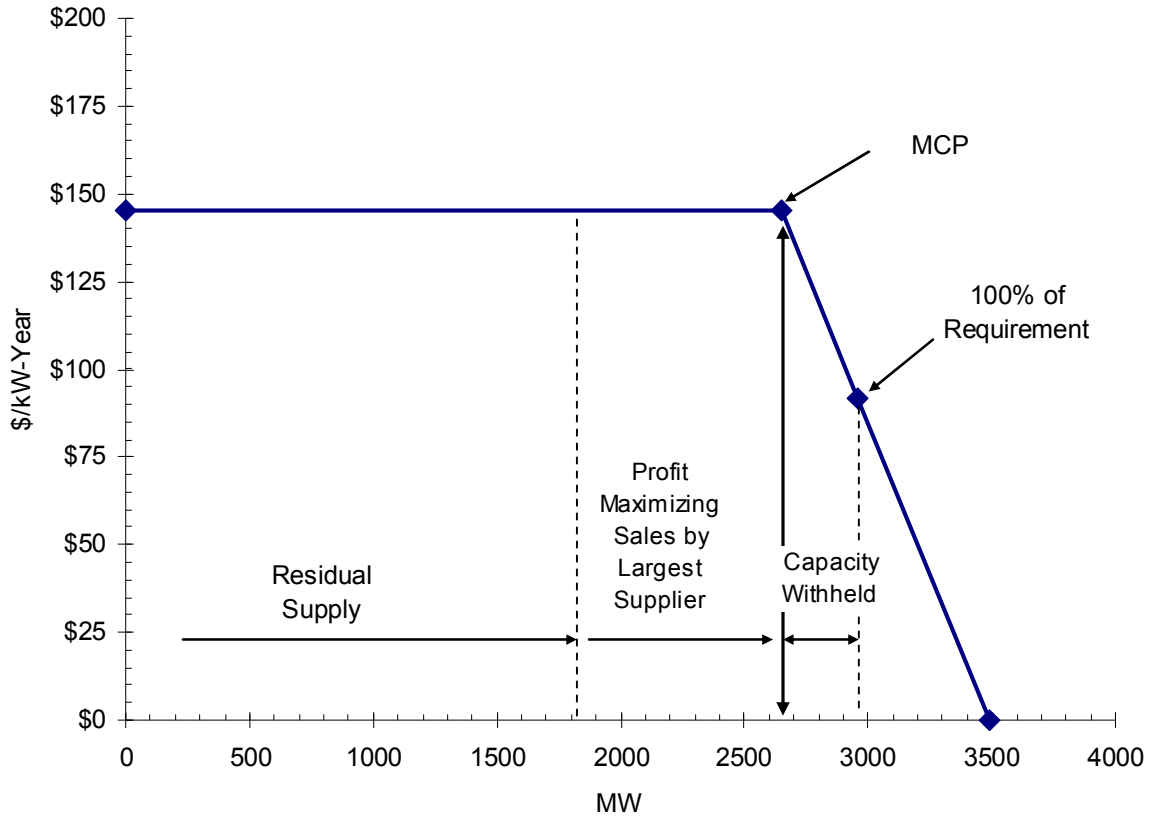


Figure 3. Potential Unilateral Market Power
San Diego Area



The basic approach illustrated in Figures 2 and 3 was also used to assess the potential impact of various levels of new supply on capacity market results. Results of this analysis, as summarized in Table 2, indicate that:

- The addition of about 600 MW of new supply (owned by entities other than the two existing largest suppliers in San Diego) would increase the overall level of capacity in San Diego to about 120% of the area's 2008 local capacity requirement.

- Under this scenario, the unilateral market power of the largest supplier would be reduced to the point where the profit maximizing level of supply sold by NRG would result in a MCP equal to 100% of the net CONE ($92/kW/year).

- The addition of only 300 MW of new supply would increase the overall level of capacity in San Diego to about 110% of the area's 2008 local capacity requirement, at which point the profit maximizing level of supply sold by NRG would result in a MCP equal to about 128% of net CONE ($118/kW/year).

- The addition of about 890 MW of new supply would increase the overall level of capacity in San Diego to about 130% of the area's 2008 local capacity requirement, at which point the

profit maximizing level of supply sold by NRG would result in a MCP equal to about 73% of net CONE ($67/kW/year).

Table 2. Potential Impact of New Supply on Capacity Market Results
San Diego Area

				Capacity Market Outcomes		
Scenario	Scenario Assumption (New Supply)	Supply as % of LCA Requirement	Supply Owned by Largest Supplier	MCP ($/kW/yr)	MCP as % of Net CONE	MCQ (% of Req.)
2008 LCR Study	None	100%	38%	$143	156%	90%
1	300 MW	110%	35%	$118	128%	95%
2	**600 MW**	**120%**	**32%**	**$92**	**100%**	**100%**
3	890 MW	130%	29%	$67	73%	105%

Western LA Basin

The demand curve approach proposed by Constellation and Mirant – as well as the direct bid mitigation approach proposed by CFCMA – suggest that the local capacity auctions would be performed using the Local Capacity Areas (LCAs) defined by the CAISO. However, as noted in previous comments, DMM believes additional analysis of how specific capacity requirements may be established for some local areas is necessary, such as the Bay Area and Western LA Basin. Specifically, DMM notes that in these areas, it may be difficult to specify a fixed capacity requirement, due to the existence of various layers of reliability constraints and sub-area requirements. Incorporating these various sub-area constraints within LCAs into capacity market requirements will show that the degree of local market power is much greater than may be suggested based on the overall LCA supply margin and concentration of ownership reflected in aggregate LCA requirements and supply data.[10]

An example of this type of sub-area or constraint is the Western LA Basin. In the CAISO's 2007 *Local Capacity Technical Analysis*, this area was identified as a separate sub-area, for which a specific additional capacity requirement was established.[11] As shown below, one supplier owns

[10] If these additional layers or dimensions of local reliability requirements are ignored, auction results based on a fixed capacity requirement may be highly inefficient and/or require the CAISO to rely on backstop contracting ability to meet local reliability requirements. Thus, while ignoring these additional layers or dimensions of local reliability requirements might allow local capacity auctions to be run based on a relatively simple market design based on a single market clearing price, this would not solve this fundamental problem.

[11] *2007 Local Capacity Technical Analysis, April 21, 2006, page 59,* http://www.caiso.com/17e2/17e2851b23400.pdf In the *2008 Local Capacity Technical Analysis*, results identify three separate transmission constraints which may constitute the single largest contingency that would need to be met by local capacity. One of these – the Barre outage – appears to correspond closely with the sub-area requirements for the Western LA area provided in the 2006 LCA Study. Specifically, the effectiveness factors for the constraint provided in the study show that the bulk of the capacity that is effective to meet this contingency is

45% of the capacity within the sub-area, and is clearly pivotal in order to meet the capacity requirement for this sub-area.

Table 3. Local Capacity Requirements and Available Supply Western LA Basin Sub-Area

Sub-Area Area Requirement	3,788 MW (2007 LCA Study)
Sub-Area Supply	
Williams (Bear Stearns)	2,019 MW (45% of sub-area supply)
Other Suppliers	2,376 MW (55% of sub-area supply)
Total Sub Area	4,432 MW (117% of sub-area requirement)

Given these supply and demand conditions, the same approach that was illustrated in the previous section can be applied to assess the potential unilateral market power that would exist in the Western LA Basin under the demand curve approach to a local capacity market. Results of this analysis are shown in Figure 4 and Table 4. Table 4 also includes summary results for a variety of scenarios which show the potential impact of additional new supply additions on capacity market results.

- As shown in Figure 4, the largest supplier would maximize revenues form the capacity market by selling just over 1,000 MW, or about half of the largest supplier's actual installed capacity.[12]
- At this level of sales, the capacity MCP clears at $138/kW/year, or 50% above the net CONE used to set the demand curve, as shown in the base case scenario in Table 4.
- The volume of total capacity clearing the auction equals about 3440 MW, or only about 91% of the local capacity requirement.

As shown in Table 4, the amount of supply within the Western LA Basin sub-area currently equals about 117% of the 2007 capacity requirement for this sub-area. However, due to the very large portion of existing supply owned by the largest supplier (45%), significant additional supply would be needed to ensure more competitive market outcomes.

- With the addition of about 680 MW of new supply, the unilateral market power of the largest supplier would be reduced to the point that the profit maximizing level of sales by the largest supplier would result in a capacity MCP equal to the net CONE used to set the demand curve ($92/kW/year).
- However, under this scenario, the total amount of supply within the Western LA Basin would need to be increased from 117% to 135% of the capacity requirements for the sub-area.

This further illustrates how it may be inefficient or insufficient to rely on competition from potential new resources to mitigate the market power of existing suppliers within areas of the

owned by Williams. However, since results in this study did not include a specific requirement for the Western LA sub-area, analysis in this report is based on data presented in the 2007 study.

[12] These results are not significantly affected by the assumption of the supplier's net going forward fixed costs (i.e., $0 or $16/kW/year).

CAISO grid such as the Western LA sub-area. In addition, within local areas such as this, significant barriers to entry may also exist that make it difficult for the market monitor to assess the actual cost of new entry to be used in the demand curve for local areas. For these reasons, DMM believes that any proposal should include additional provisions to explicitly mitigate local market power, and should avoid over-reliance on entry of new capacity in load pockets.

Figure 4. Potential Unilateral Market Power
Western LA Basin

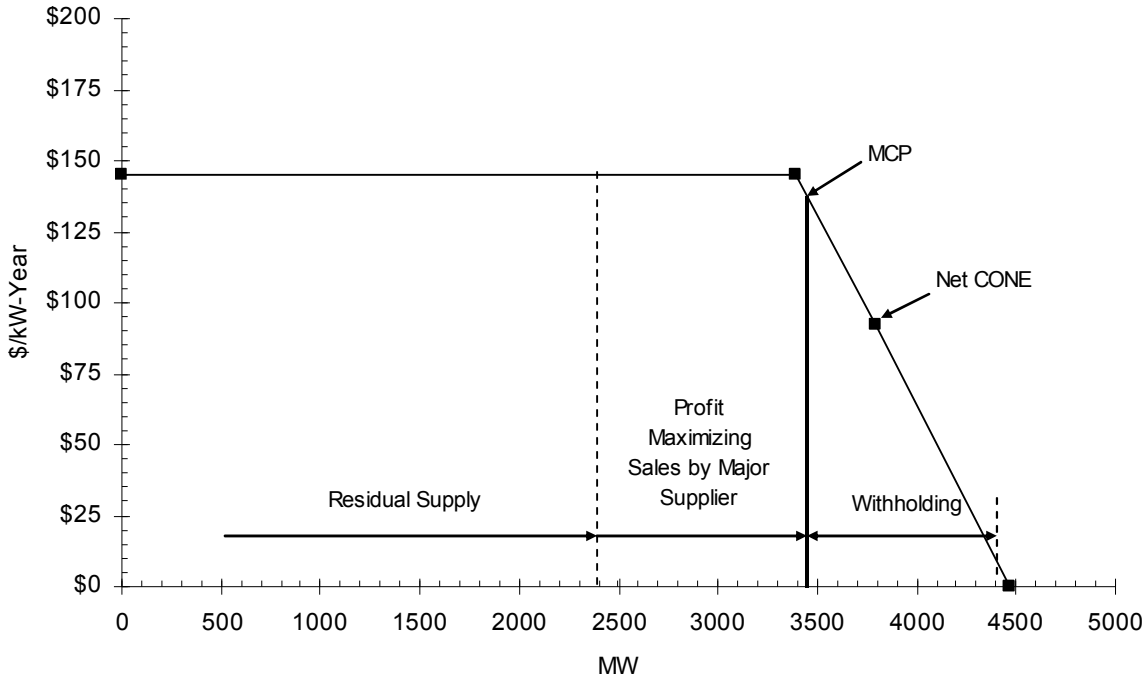


Table 4. Potential Impact of New Supply on Capacity Market Results
Western LA Basin

				Capacity Market Outcomes		
Scenario	Scenario Assumptions (New Supply)	Supply as % of LCA Requirement	Supply Owned by Largest Supplier	MCP ($/kW/yr)	MCP as % of Net CONE	MCQ (% of Req.)
2007 LCR	none	117%	45%	$138	150%	91%
1	300 MW	125%	42%	$118	128%	95%
2	500 MW	130%	41%	$104	114%	98%
3	**680 MW**	**135%**	**39%**	**$92**	**100%**	**100%**
4	870 MW	140%	38%	$79	86%	102%

Bay Area

Within the Bay Area, two suppliers each own a large portion of the supply available to meet local area capacity requirements, as reflected in the information in the CAISO's *2008 Local Capacity Technical Analysis* provided in Table 5.

Table 5. Local Capacity Requirements and Available Supply Bay Area

Bay Area Requirement	4,688 MW
Bay Area Supply	
Calpine	2,573 MW (41% of supply)
Mirant	2,347 MW (38% of supply)
PG&E	613 MW (10% of supply)
Other	681 MW (11% of supply)
Total	6,215 MW (132% of requirement)

Given the relatively large portion of capacity owned by the two largest suppliers within the Bay Area, the approach for assessing unilateral market power illustrated in previous sections of this report may significantly underestimate that actual local market power.[13] Under such market conditions there is a strong potential for duopolistic market power due to the very large combined market share controlled by the two largest suppliers (89%). Therefore, this section examines the potential for local market power in the Bay Area from the perspective of unilateral and duopolistic market power.

Figure 5 shows an assessment of the potential for unilateral market power given the current supply and demand conditions in the Bay Area. Results of this analysis indicate a much lower degree of local market power within the Bay Area than in other areas examined in this report:

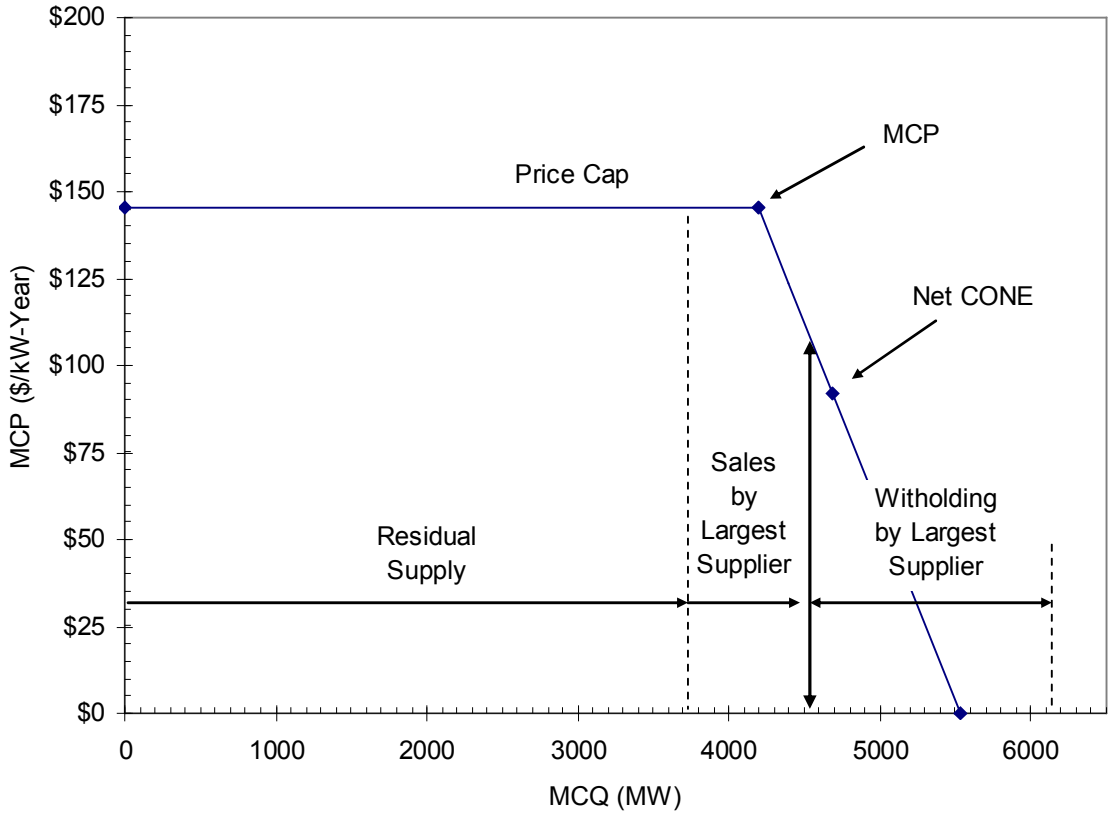
- The profit maximizing level of supply sold by the largest supplier equals about 820 MW, or about 35 percent of the largest supplier's actual installed capacity, for the base scenario.
- The MCP clears at an MCP of $106/kW, or about 15% above the net CONE used to set the demand curves.
- The MCQ equals about 97.4% of the local capacity requirement.
- Under the assumption of net GFFC of $16/kW/year, the optimal level of withholding is slightly lower, with the largest supplier selling almost 900 MW, so that total capacity

[13] In addition, as in the case of the Greater LA Basin, additional layers of reliability constraints exist within the Bay Area that would need to be factored into any local capacity auction in order to ensure that these reliability requirements are met. Examples of these various constraints or sub-area requirements are identified in the CAISO's *2008 Local Capacity Technical Analysis* and *2007 Local Capacity Technical Analysis.* Incorporating these various sub-area constraints within Local Capacity Areas into capacity market requirements will show that the degree of local market power is much greater than may be suggested based on the overall LCA supply margin and concentration of ownership reflected in aggregate LCA requirements and supply data.

clearing the market equals about 99% of the requirement. Under this scenario, the MCP clears at $98/kW/year, or about 6% above the net CONE used to set the demand curves.

Further analysis of the potential for unilateral market power in the Bay Area under scenarios representing different levels of new supply is provided later in this section.

Figure 5. Profit Maximizing Level of Capacity Sales for Largest Supplier Bay Area



The potential for duopolistic market power can be assessed using a simple Cournot model of market behavior under duopolistic conditions. With this approach, the reaction function of each of the two major suppliers is calculated – representing the profit maximizing amount of capacity sold by each supplier given various levels of sales by the other major supplier.[14] The intersection of the suppliers' reaction functions represents the Cournot equilibrium – or optimal level of sales by each of the two suppliers. Figures 6 and 7 show results of this analysis for the two largest suppliers in the Bay Area.

- As shown in Figure 6, the reaction functions of each supplier intersect at multiple points, reflecting multiple combinations of duopolistic equilibrium. Under each of these points, the

[14] It is assumed that all other supply is bid as a price taker, so that the residual demand facing the two major suppliers is equal to the demand curve for local capacity less the residual supply of capacity of the other suppliers.

two major suppliers each sell between 1,300 and 1,500 MW, with a total of 2,800 MW sold by the two suppliers combined.

- As shown in Figure 7, the optimal level of combined sales for the two major suppliers corresponds to the point at which the demand curve reaches the price cap of $145, which is set at 58% above the net CONE.[15]

- Under this scenario, total capacity clearing the auction would equal about 90% of the local area capacity requirement.

- Under the assumption of net GFFC of $16/kW/year, the overall net revenues earned by the two suppliers are reduced, but the overall market clearing prices and quantities remain the same.

Thus, although analysis might suggest that only a moderate level of unilateral market power may exist in a local capacity market based on a demand curve for the Bay Area, these results suggest that very high potential for uncompetitive market outcomes would exist due to very large market share of the two largest suppliers in the Bay Area.

Figure 8 shows the impact of an additional 350 MW of new supply on the Cournot equilibrium for the two largest existing suppliers within the Bay Area. As shown in Figure 8:

- Under this scenario, the reaction functions intersect at a single point, indicating the existence of a unique Cournot equilibrium.

- Under these conditions, the two suppliers would maximize profits by each selling about 1,260 MW at an MCP of $138/kW/year.

Table 6 summarizes results of other scenarios showing the impact of various levels of new supply additions on the potential local market power within the Bay Area, using the unilateral and Cournot approaches for assessing market power previously described in this paper.

Figure 9 shows a comparison of results derived using the unilateral and Cournot approaches, in terms of how the MCP for capacity declines as the amount of supply increases (as a percentage of total capacity requirements).

[15] In fact, the existence of multiple equilibriums is attributable to the effect the price cap has on the reaction function of each supplier. Further analysis shows that if the price cap is removed (or raised), a single unique Cournot equilibrium would exist with each owner selling 1,379 MW at a price of $150.

Figure 6. Reaction Functions of Two Largest Suppliers
Bay Area

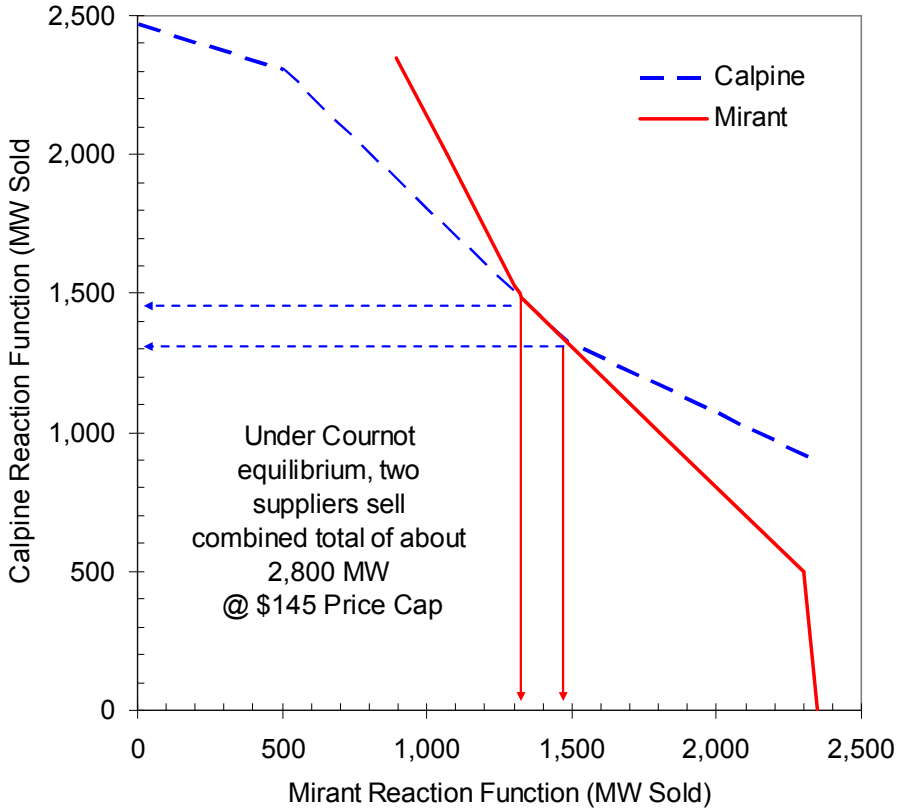


Figure 7. Local Capacity Market Outcomes under Duopolistic Bidding Scenario

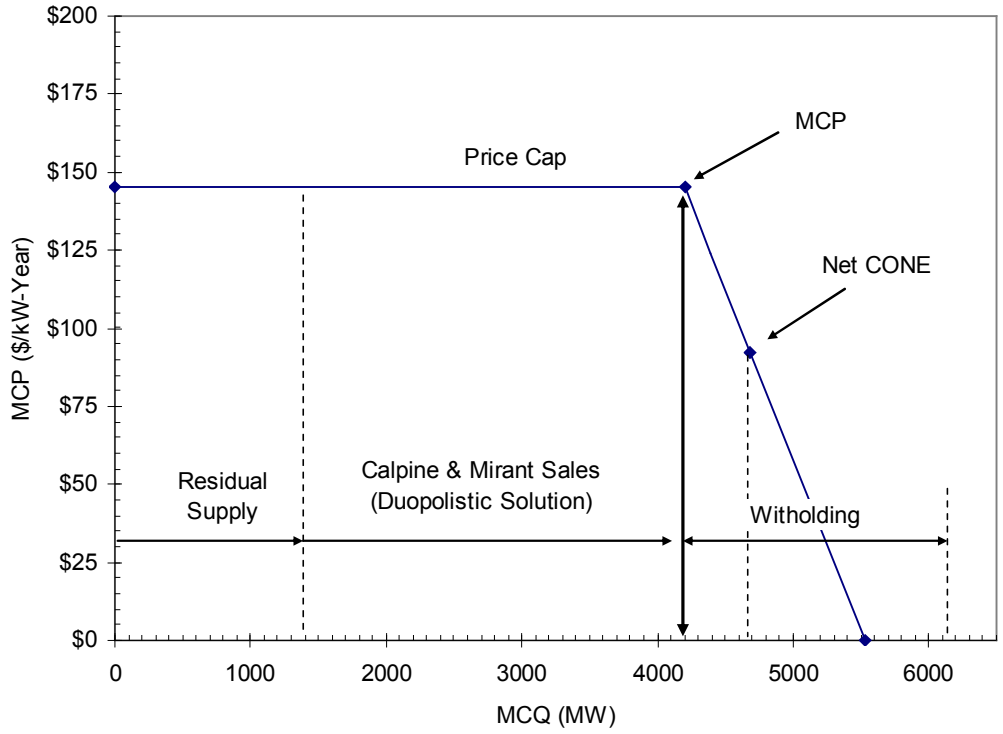


Figure 8. Reaction Functions of Two Largest Suppliers
350 MW of New Supply in Bay Area

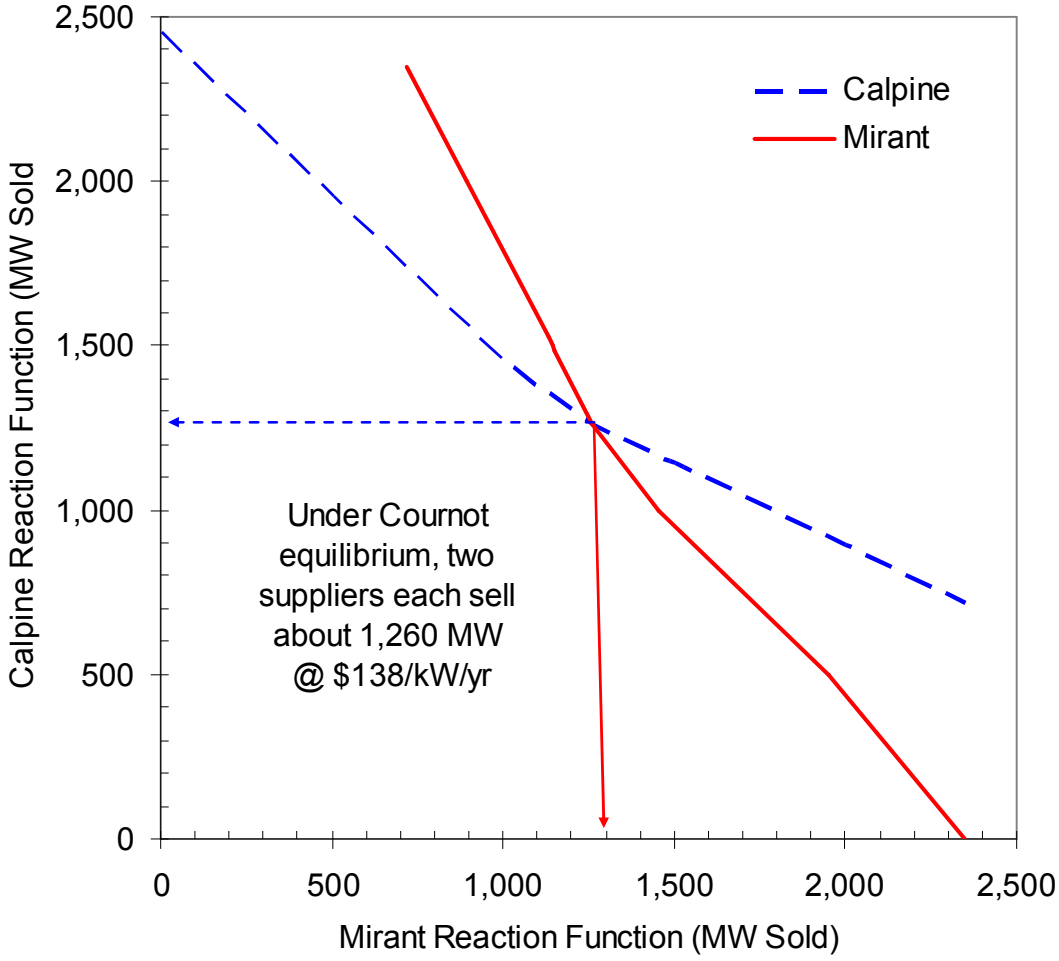
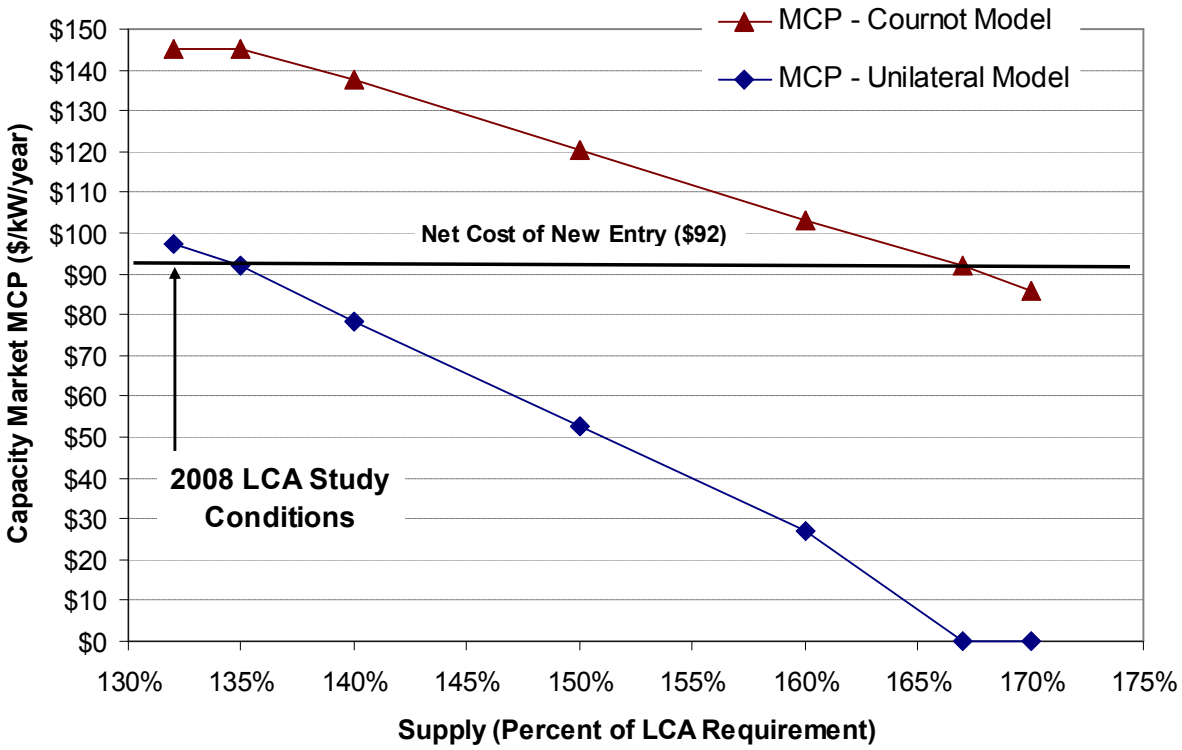


Table 6. Comparative Analysis of Potential Local Market Power in Bay Area Unilateral and Cournot Approaches

		Market Shares		Unilateral Approach		Cournot Approach	
	Supply Margin	Calpine	Mirant	MCP	% Net CONE	MCP	% Net CONE
2008 LCA Study	132%	41%	38%	$98	106%	$145	158%
100 MW of New Supply	**135%**	**39%**	**37%**	**$92**	**100%**	**$145**	**158%**
350 MW of New Supply	140%	38%	36%	$78	85%	$138	150%
825 MW of New Supply	150%	35%	33%	$53	57%	$120	131%
1,300 MW of New Supply	160%	33%	31%	$27	30%	$103	112%
1,610 MW of New Supply	**167%**	**32%**	**30%**	**$ 0**	**0%**	**$ 92**	**100%**
1,775 MW of New Supply	170%	31%	30%	$ 0	0%	$ 86	93%

Figure 9. Comparative Analysis of Potential Local Market Power in Bay Area Unilateral and Cournot Approaches



As shown in Table 6 and Figure 9, results of this comparative analysis show that in the Bay Area, despite the relatively large level of supply currently available to meet 2008 capacity requirements in the Bay Area (132%), the potential for local market power may be significantly higher due to the relatively large portion of supply owned by the two largest suppliers.

- From the perspective of unilateral market power, the addition of a very small amount of new capacity (100 MW) would make the unilaterally optimal capacity MCP drop to the net CONE ($92/kW/year). However, under the assumption of duopolistic market behavior, the capacity MCP would continue to clear at the price cap of $145/kW/year under this scenario.

- Under the assumption of duopolistic market behavior, about 1,610 MW of new supply would be needed before the capacity MCP would clear at the net CONE of $92/kW/year. This represents an increase in the level of supply from the current level of 132% of local capacity requirements to a level of 167% of local capacity requirements.

These results further illustrate how it may be inefficient or insufficient to rely on competition from potential new resources to mitigate the market power of existing suppliers within areas of the CAISO grid. In addition, these results illustrate that within areas where two suppliers each control a relatively large share of existing supply, simple techniques for assessing unilateral market power (e.g., pivotal supplier tests) may significantly underestimate the potential for local market power.[16]

IV. Conclusions

Results of this analysis illustrate several points made in previous comments submitted by DMM in these proceedings:

- Although the need for local market power mitigation may be significantly lessened investment in new resources within LCAs, relying on such capacity additions may be an ineffective or insufficient means of mitigating the local market power within the CAISO's major LCAs. Due to the relatively high portion of existing supply owned by one or two suppliers in these areas, the level of new supply needed to ensure competitive outcomes under the demand curve approach would resulting in total supply levels greatly exceeding actual local capacity requirements. Since the cost of new capacity in these LCAs is likely to exceed the cost of supply in less constrained areas, this approach may significantly increase the overall costs of new capacity needed to meet CAISO system and local reliability needs.

- Within areas where two suppliers each control are relatively large share of existing supply — such as the Bay Area — commonly used techniques for assessing unilateral market power (such as pivotal supplier tests) may significantly underestimate the potential for local market power under the demand curve approach. As shown by the simple Cournot approach used in this analysis, the potential for significant local market power may exist when more commonly used analyses or tests of unilateral market power suggest that the demand curve approach would result in competitive outcomes.

[16] The Cournot approach applied to assess local market power in the Bay Area was also applied to the San Diego area, where the second largest supplier also controls a relatively high portion of supply (24%). However, results of this analysis showed that the capacity MCPs under the Cournot approach would be the same as the MCPs resulting from the unilateral approach, as summarized in Table 2.

- This analysis furthers suggest that more direct approaches for mitigation of local market power — such as those incorporated in the capacity market proposal of the CFCMA — are likely to more effective mitigation of local market power that a NYISO style demand curve approach, without relying heavily on investment in additional new supply well beyond levels that would be economically efficient or needed to meet actual local capacity requirements. Under the CFCMA approach, when existing supplies exceed local capacity requirements, local capacity market prices would presumably not clear above the net cost of new supply at a system level.[17] However, if new supply is needed within an LCA to met actual local capacity requirements, local capacity market prices would presumably at the net cost of new supply within the LCA. In comparison to range of prices that may result under the demand curve approach, such capacity prices would appear to effectively mitigate local market power, while still providing efficient signals for investment in new supply within LCAs as such additions are needed.

Finally, it should be noted that some of the concerns about the NYISO style demand curve approach proposed by Constellation illustrated in this paper could be lessened by modifying this approach to include strong provisions to prevent economic and physical withholding. For instance, economic withholding by major suppliers deemed to have market power might be addressed by requiring this capacity to be bid as price takers (at a price or $0), while physical withholding might be addressed by "netting" any capacity hot bid into the auction off of the demand curve. However, even with such revisions, other potential problems may remain, particularly as the demand curve approach is applied to LCAs, where the actual demand for capacity needed to meet local reliability requirements is essentially inelastic.[18] A detailed discussion and analysis of such potential modifications — and how the resulting approach might compare to the approach proposed by CFCMA — is beyond the scope of this a paper.

[17] This assumes that the net going forward fixed cost (net GFFC) of existing supply is less than the net cost of new supply on a system level. In this case, if new supply is actually needed at a system level, local capacity market prices would presumably clear at the net cost of this new supply. If no new supply was needed at the system or local level, local capacity prices would presumably clear at the higher of 60% of net CONE or the net GFFC of existing supply within local areas.

[18] For example, in LCAs where existing supply exceeds local requirements by a significant amount (such as the Bay Area and LA Basin), a demand curve approach (modified to include provisions to prevent economic and physical withholding), could result in very low capacity prices and/or procurement significantly in excess of actual local capacity needs. Meanwhile, in LCAs where existing supply is insufficient to meet local requirements, a demand curve approach could result in very high capacity prices for existing suppliers without actually incenting new supply.