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

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Background

- **CPUC and CAISO leading ongoing effort to consider centralized capacity market in California.**
- **Local market power mitigation key part of any centralized capacity market design in CA.**
  - Ownership of supply within major local pockets in California highly concentrated (e.g., 2 major suppliers).
- **Two major approaches proposed:**
  - Demand curve approach (NYISO-style)
  - Direct bid/price mitigation (similar to PJM, ISO-NE)

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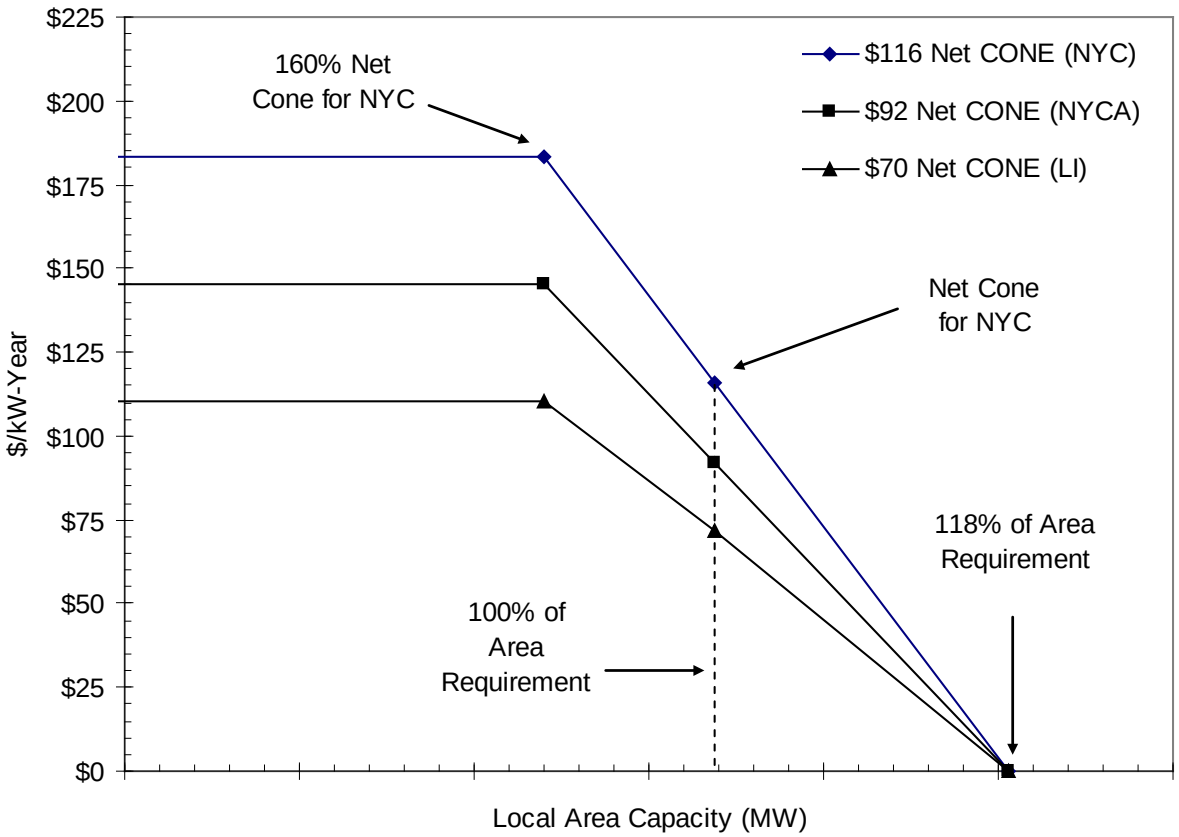
Demand Curve Approach

- **Relatively high bid cap on suppliers**
  - e.g., 160% of the Net Cost of New Entry (CONE)
- **Administratively set demand curve used to establish "demand elasticity"**



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Analysis of Demand Curve Approach: Methodology

- **Shape of administrative demand curve based on NYISO demand curve for New York City area**
- **Data on local area capacity requirements and available supply based on CAISO 2007 and 2008 CAISO Local Capacity Area (LCA) studies**
- **The major LCAs examined:**
  - San Diego
  - Western LA Basin (sub-area of LA Basin LCR)
  - San Francisco Bay Area
- **Two approaches for modeling market power:**
  - Pivotal Supplier (Unilateral model)
  - Cournot Equilibrium (Duopolistic *reaction function* model)

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San Francisco Bay Area: Local Area Requirements and Supply

Bay Area Capacity 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)

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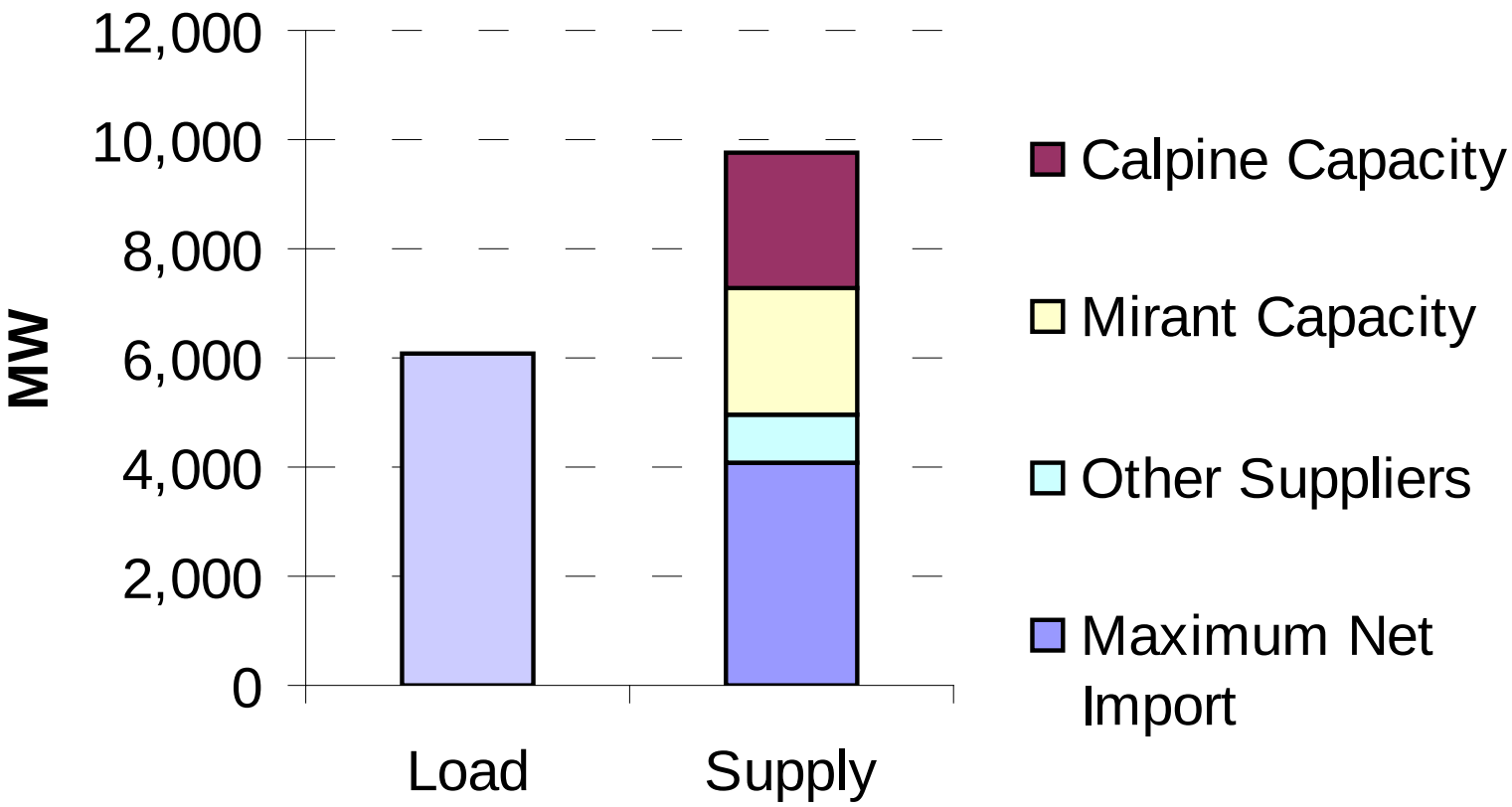
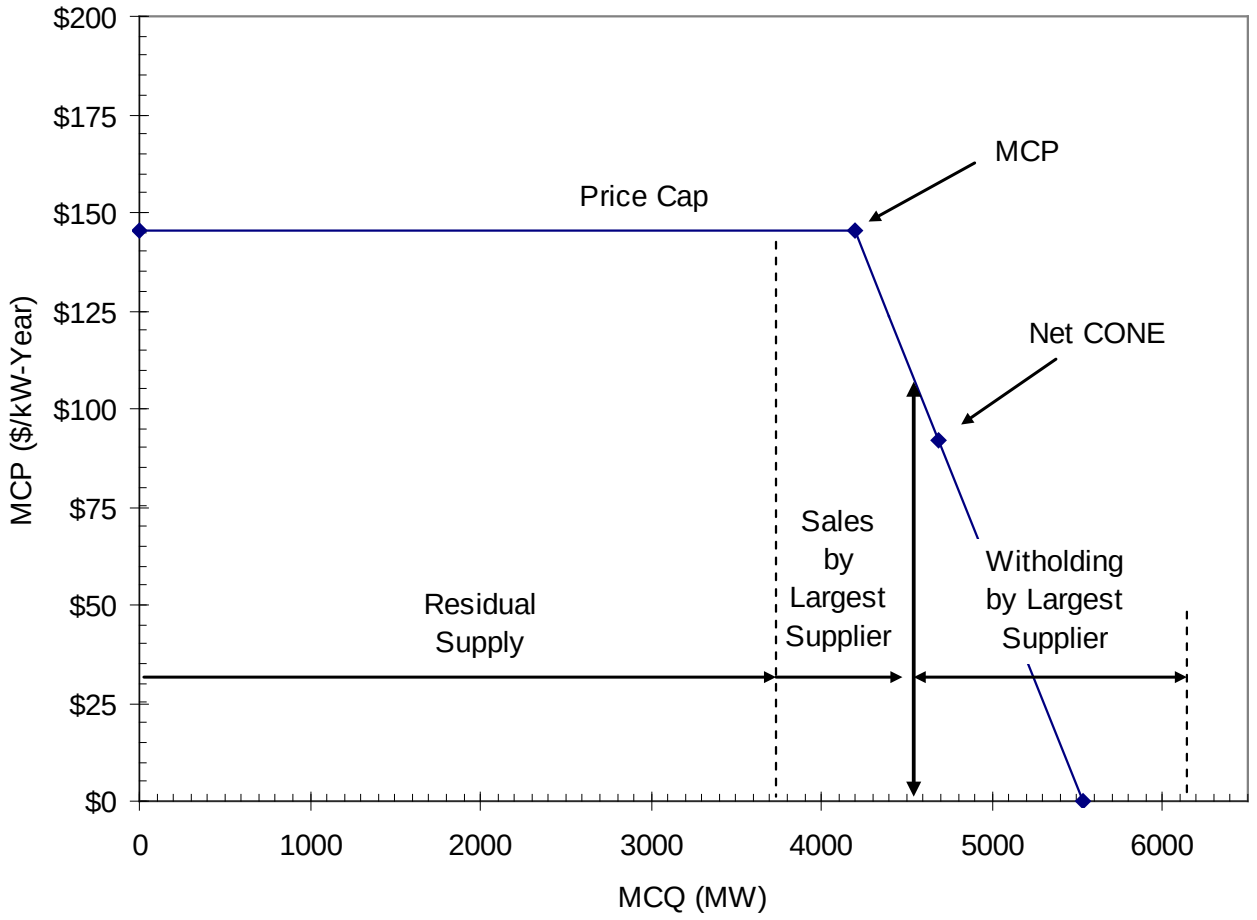
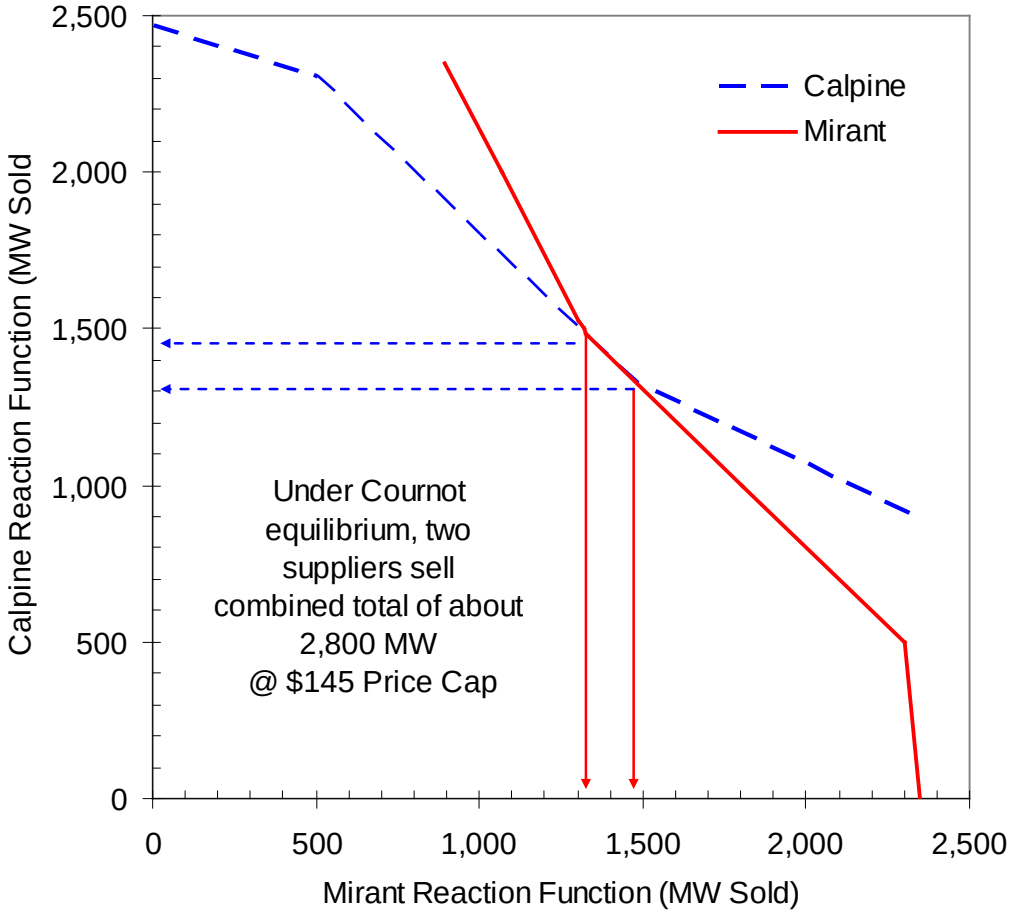
Supply and Demand Balance (Bay Area)



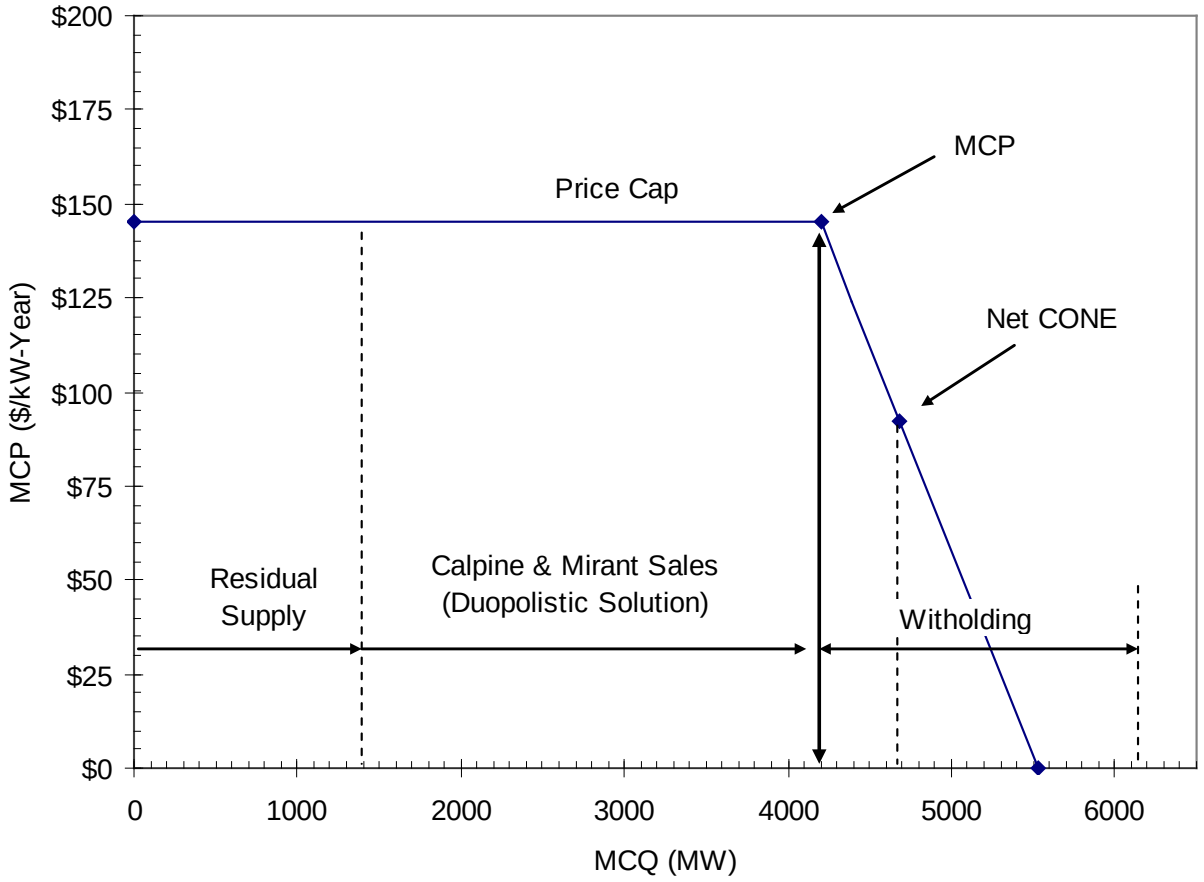
Profit Maximimizing Level of Sales by Largest Supplier under Unilateral Model of Market Power



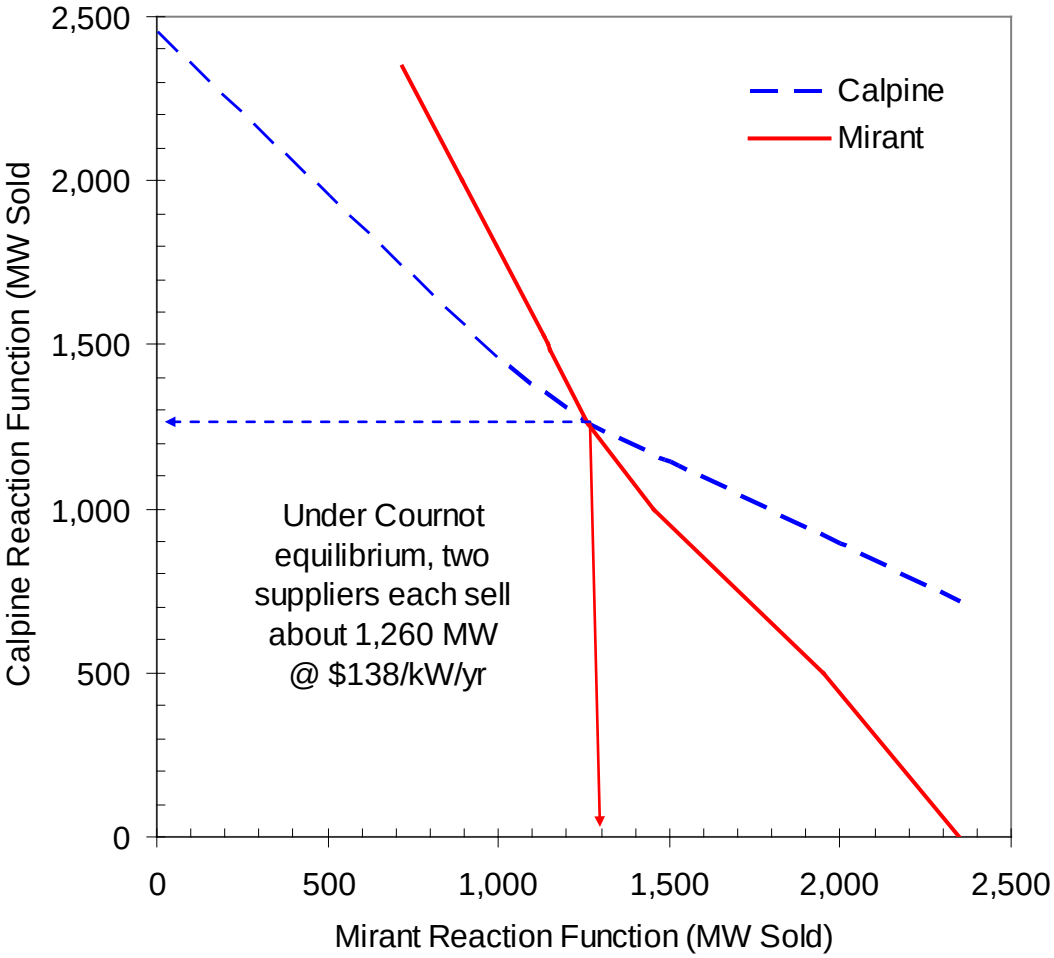
Reaction Functions of Largest Two Suppliers in Bay Area



Profit Maximimizing Level of Sales by Largest Suppliers under Duopolistic Model of Market Power



Reaction Functions of Largest Two Suppliers with Addition of 350 MW of Residual Supply



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Comparative Analysis of Potential Local Market Power Using 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%

- **Under unilateral model, addition of 100 MW would lower MCP to 100% Net Cone.**
  - Supply = 135% of local capacity requirement
- **Under duopolistic model, addition of 1,610 MW would be needed to lower MCP to 100% Net Cone.**
  - Supply = 167% of local capacity requirement

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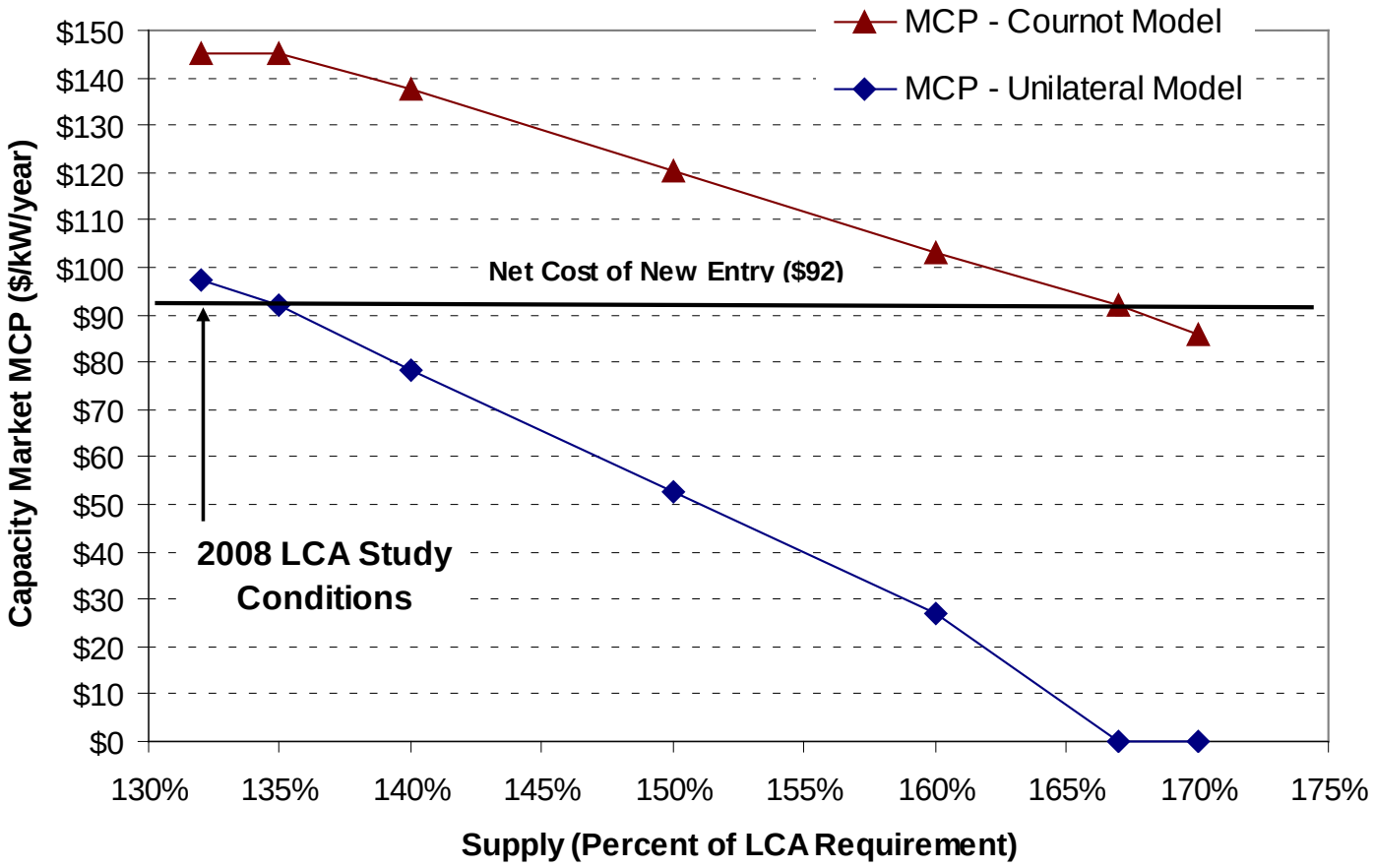
Comparative Analysis of Potential Local Market Power Using Unilateral and Cournot Approaches



Conclusions

- **NYISO-style demand curve approach unlikely to be effective at mitigating local market power within CAISO's major load pockets (LCAs)**
- **Unilateral models of market power likely to dramatically underestimate degree of local market power.**
- **Even if significant new capacity by "residual suppliers" could be added in these areas, this would probably be economically inefficient**
  - Very high supply margins in excess of actual capacity requirements would be needed to mitigate local market power of existing suppliers.
- **Direct bid/price mitigation such as that used in PJM and ISO-NE likely to be more effective and economically efficient.**

Additional Materials

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Western LA Basin:
Local Capacity Requirements and Supply

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)

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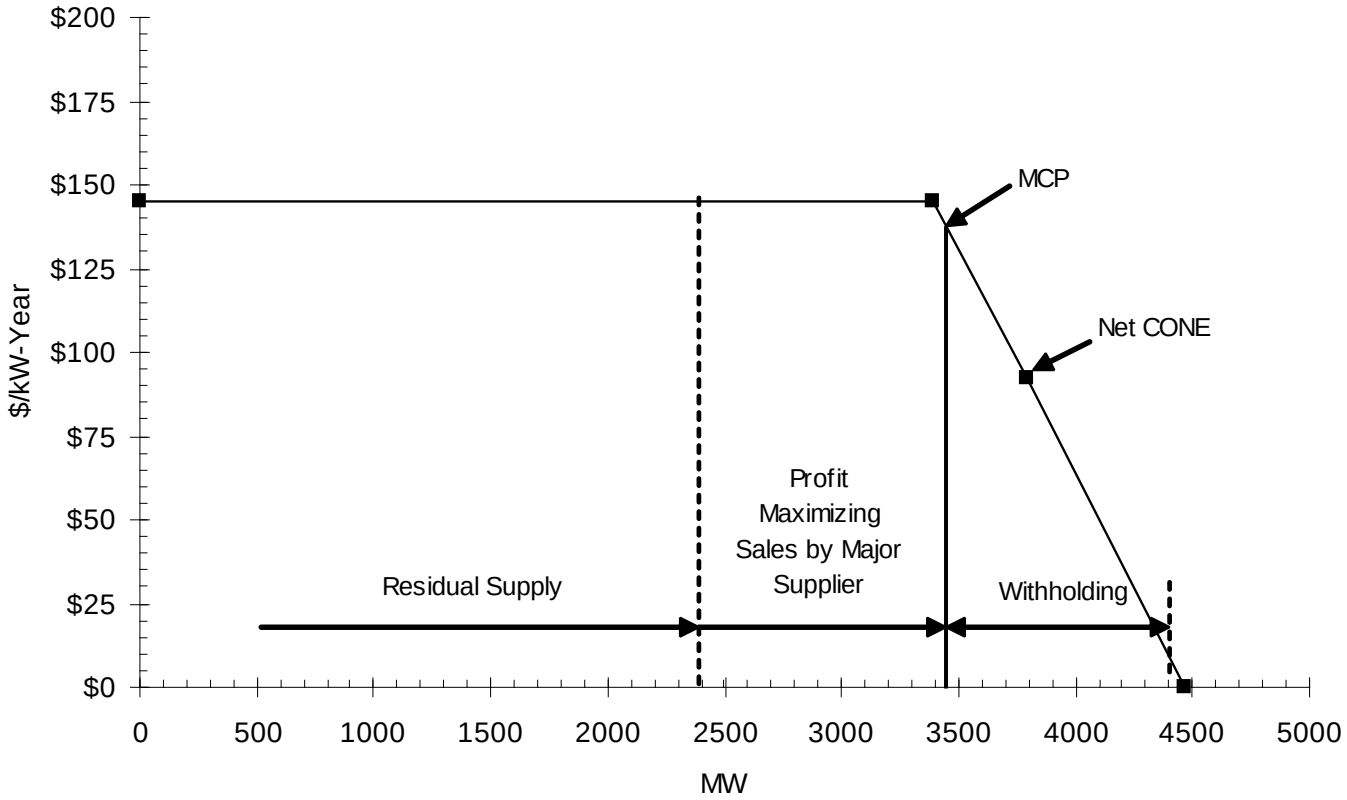
Western LA Basin – Base Case



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Western LA Basin – Scenario Analysis

Table 1. Potential Impact of New Supply on Capacity Market Results Western LA Basin

Scenario	Scenario Assumptions (New Supply)	Supply as % of LCA Requirement	Supply Owned by Largest Supplier	Capacity Market Outcomes: MCP ($/kW/yr)	Capacity Market Outcomes: MCP as % of Net CONE	Capacity Market Outcomes: 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%

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San Diego LCR:
Local Capacity Requirements and 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)	

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San Diego LCR – Scenario Analysis

Table 1. Potential Impact of New Supply on Capacity Market Results
San Diego Area

Scenario	Scenario Assumption (New Supply)	Supply as % of LCA Requirement	Supply Owned by Largest Supplier	Capacity Market Outcomes: MCP ($/kW/yr)	Capacity Market Outcomes: MCP as % of Net CONE	Capacity Market Outcomes: 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%

Direct Bid/Price Mitigation Approach

- **Existing Suppliers subject to price impact test if:**
  - Bid >60% of net CONE, and
    - Controls >20% of capacity in local area or
    - Is individually pivotal in local area
- **Price Impact Test**
  - Auction first run with participant's bid, and then with net Avoidable Cost Rate (Net ACR)
  - If use of unmitigated market bid increases capacity market price >5%, then mitigated bid (Net ACR) used in final auction
- **Physical withholding prevented in local market by provisions that allow "de-listed" capacity to count toward local area requirement.**
- **Overall market price cap of 140% of Net Cone mitigates potential market power if price set by new supply.**