

# Strategy 1 – Forced Outage Exposure Management

## PG&E Procedure - Implementation Circumstances

### Overview

PG&E may submit virtual demand bids to hedge a fraction of the generation that a resource owned or contracted for by PG&E is expected to generate in the Integrated Forward Market (IFM) against Real Time (RT) imbalance charges that occur when the resource fails to deliver energy awarded in the IFM. The circumstances under which PG&E would submit such virtual demand bids will be when outage and price risk is high. The volume of the hedge would never exceed 50% of the forecasted generation output of the resource.

### Specific

1. PG&E will determine if the day-ahead **peak load forecasted by the CAISO** equals or **exceeds 40,000MW** from publicly available information on the CAISO's OASIS website. The basis for this threshold is that historically, when the CAISO load forecasts exceed 40,000 MW, frequency of forced outages increase and RT price risk is highest.
2. Under these circumstances, day-ahead IFM demand convergence bids for **super peak hours (HE13-HE20)** will be submitted with **volumes based on probability of derate** for different resource types (hydro, thermal, nuclear) during high load conditions for any resource with **capacity exceeding 500MW** such that the volume of the virtual demand equals the expected lost generation. Currently applicable resources are DCPD 1&2, MLPP 6&7, PPP 7, McCloud/Pitt and Feather River systems, and Gateway.

For example, a 500MW thermal plant has a historical outage rate of 10% during high load conditions, 50MW of price taker virtual demand will be submitted at its node for each of the super peak hours if the resource is forecasted to be online.

# Strategy 1 – Forced Outage Exposure Management

**Issue:** If a resource fails to deliver scheduled energy, it pays charges at the RT price for energy not delivered

**Mitigation:** Virtual Demand bids hedge plant output

**Specific Example:** Moss Landing Unit 6, Pmax = 754 MW, CAISO DA Forecast Load > 40,000 MW  
Submit Virtual Demand Bids in IFM for HE 13-20

## Analysis (single hour, HE16):

- Virtual Demand bids submitted that reflect the probability and size of derate/outage as price taker
- Let Q = Quantity scheduled in the IFM = 754 MWh
- Let VD = Quantity of Virtual Demand in the IFM = 754 MWh \* 3% (Outage Rate) = 23 MWh
- Let R = Energy delivered in RTM = 0 MWh (Outage)
- Let IFM Price = \$50/MWh, RTM Price = \$500/MWh

### Physical Settlement

DA Market: SELL IFM \* Q

Get Paid: **\$37.7k** (\$50/MWh \* 754 MWh)

RT Market: BUY RTM \* (Q – R)

The resource fails to deliver scheduled energy Q, it pays imbalance charges at the RT price for (Q-R).

Pay Out: **\$377k** (\$500/MWh \* 754 MWh)

Net Physical: Pay out **\$339.3k**

### Virtual Settlement

DA Market: BUY IFM \* VD

Pay Out: **\$1.2k** (\$50/MWh \* 23 MWh)

RT Market: SELL RTM \* VD

Virtual day ahead bid gets liquidated at the real time price.

Get Paid: **\$11.5k** (\$500/MWh \* 23 MWh)

Net Virtual: Get Paid **\$10.3k**

The generator is partially hedged against RT imbalance charges

➤ Net Physical + Net Virtual = **\$329k**

**\*With all applicable resources, using the same example 3% outage rate, Virtual Demand bids for HE16 would total 186MWh, and provide a total virtual demand bid payout of \$83.7k**

# Illustrative Post-DA Schedule Derate/Outage Rates for Current List of Applicable Resources for Strategy 1

<b>Resource Name</b>	<b>Post-DA Schedule Derate/Outage Rates Quarterly Ranges*</b>
Diablo Canyon Unit 1	0% - 1.5%
Diablo Canyon Unit 2	0% - 6.9%
Moss Landing Unit 6	0.2% - 11.4%
Moss Landing Unit 7	0.5% - 1.2%
Pittsburg Power Plant Unit 7	na / tbd
Gateway Generation Station	0.4% - 1.7%
McCloud Pitt Hydro System	0% - 1.8%
Feather River Hydro System	0.5% - 1.2%

\* Based on Q2 2009 – Q1 2010 historical, post-DA market close derate/outage rates relative to DA schedules for applicable units. Actual rates used for convergence bidding may vary based on future (quarterly) updates to these historical rates and with dynamic operator outage assessments.

# Strategy 2 - Increased Operational Flexibility for Thermal Resources

## PG&E Procedure - Implementation Circumstances

### Overview

PG&E may use virtual supply bids for long-start thermal resources whose energy cannot be bid directly into the CAISO's IFM due to market design limitations that enforce artificial minimum down times when the initial conditions for the IFM do not match physical realities.

### Specific

1. PG&E may submit day-ahead IFM supply convergence bids for all thermal resources at **marginal cost** when the **CAISO cannot accept physical bids** for the resource due to artificial minimum downtimes when PG&E determines that it is economic to keep the resource online in Real Time using the most up-to-date forecasts. Current applicable resources are **MLPP 6&7** (754MW & 755MW), **PPP 5,6&7** (312MW, 317MW & 682MW), **CCPP 6&7** (337MW ea), and **Gateway** (590MW).

For example, a long-start 600MW thermal plant that been scheduled to zero in HE 23 or 24 in the IFM and where conditions have changed such that the resource will remain on-line and available, virtual supply bids with prices quantities matching the physical bids of the 600mw thermal plant will be submitted in the next IFM for those hours where the physical resource is precluded from bidding.

## Strategy 2 - Increased Operational Flexibility for Thermal Resources

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### Issue:

- The CAISO enforces minimum down times for resources according to operational information contained in its Master Data File.
- If a Long Start Resource (e.g., Moss Landing 7) is de-committed in the IFM, it cannot receive an IFM schedule to satisfy the minimum down time constraint *even* if we decide to keep the resource online in RT

### Mitigation:

- Virtual supply bids provide a mechanism to represent this energy in the IFM.
  - Virtual Supply Settlement =      SELL IFM                      BUY RTM
  - Physical Settlement =              SELL RTM                      Pay Dispatch Cost
  - Net Settlement =                      SELL IFM                      Pay Dispatch Cost

# Strategy 2 - Increased Operational Flexibility for Thermal Resources

**Specific Example:** Moss Landing Unit 7, Pmax = 755 MW, DA IFM Scheduled to 0 MW at HE 23  
Outlook has changed, Moss Landing 7 appears needed for the following day  
Submit Virtual Supply Bids in next IFM for HE 01-22 (24 hour minimum down time)

## Analysis (single hour, HE16):

- Virtual Supply bids submitted in the next IFM that reflect the physical resource bid prices and quantities
- Let Q = Quantity scheduled in the IFM = 0 MWh
- Let VS = Quantity of Virtual Supply in the IFM = 755 MWh
- Let R = Energy delivered in RTM = 755 MWh
- Let IFM Price = \$50/MWh, RTM Price = \$45/MWh

### Physical Settlement

DA Market: SELL IFM \* Q  
Get Paid: **\$0k** (\$50/MWh \* 0 MWh)

RT Market: Sell RTM \* (R)  
Get Paid: **\$34k** (\$45/MWh \* 755 MWh)

Net Physical: get Paid: **\$34k**

### Virtual Settlement

DA Market: SELL IFM \* VS  
Get Paid: **\$37.8k** (\$50/MWh \* 755 MWh)

RT Market: BUY RTM \* VS  
Virtual day ahead bid gets liquidated at the real time price.  
Pay Back: **\$34k** (\$45/MWh \* 755 MWh)

Net Virtual: Get Paid **\$3.8k**

The generator is reflected in the IFM and paid IFM price  
➤ Net Physical + Net Virtual = **\$37.8k**

\* Strategy 2 encompasses a total of 4084MW of applicable long-start thermal resources.