



**Pacific Gas and Electric Company**  
San Francisco, California

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Long-Term Procurement Plan

**APPENDIX B**  
**ELECTRICITY AND GAS HEDGING PLAN**

**CONFIDENTIAL**

Advice Letter No. 3492-E  
Decision No. 07-12-052

Issued by  
**Brian K. Cherry**  
Vice President  
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This Appendix describes PG&E's electricity and gas hedging plan, which is a critical part of PG&E's 2006 LTTP.

#### **A. COORDINATION BETWEEN ELECTRICITY AND GAS HEDGING**

While PG&E's electric portfolio price risk is driven in large part by its gas position, the electricity position can also contribute substantially to price risk. As a result both the electricity and gas components must be managed consistently to effectively hedge the portfolio's price risk. Hedging either component in isolation can result in mishedging the overall portfolio. For that reason, both the electricity and gas positions will be managed to the same operating targets and time horizon. The gas and electricity hedging activities will be coordinated such that the electricity position is managed to stay within the lower and upper operating targets and the resulting gas position<sup>1</sup> is then managed to stay within the same range.

#### **B. ELECTRICITY AND GAS HEDGING OPERATING TARGETS**

The gas operating targets approved in PG&E's Gas Hedging Plan ("GHP") Update 2006-1, were based on a 99% confidence interval 1-12 month To-expiration-Value-at-Risk ("TeVAr").<sup>2</sup> In Decision ("D.") 07-12-052, the Commission ordered PG&E to develop operating targets based on the 95% confidence interval TeVaR. The updated operating targets, applicable for both electricity and gas hedging, are included here. These updated operating targets represent the lower bound for the desired hedge positions. If the hedged positions fall below these targets, PG&E will execute hedges to bring the hedged positions above the lower operating targets. The upper operating targets set the upper bound for the desired hedge positions. If the hedged positions exceed the upper operating targets, PG&E will unwind hedges to bring the hedged positions below the upper operating targets.

<sup>1</sup> Management of the electricity hedge position can affect the gas position. For example, when a unit toll is added to the portfolio, the expected dispatch of that resource becomes a hedged long electric position. The gas used by the toll however, represents a short gas position which may need to be hedged.

<sup>2</sup> AL 2775-E, PG&E Electric Portfolio Gas Hedging Plan Update 2006-1 ("GHP Update 2006-1"), p. 6, Figure 4.



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PG&E shortened the tenor of the plan (the length of the delivery period that PG&E is actively hedging) from 5 years to 4 years to reduce the impact of the hedging plan on liquidity. Liquidity management is addressed in detail in Section F of this Appendix.

PG&E will hold its current hedges while the hedge positions are between the lower and upper operating targets. While the range between the lower and upper operating targets appears to be wide, financial hedging strategies are aimed at moving the portfolio hedge position to within 5 percentage points above the lower operating targets. PG&E will only execute financial hedges to move the electricity or gas hedge positions from below the lower operating targets up to the lower operating targets. However, PG&E may execute electricity transactions to manage other aspects of its electric portfolio, such as unit tolls to manage the need for operational flexibility. Such transactions also serve to hedge the electricity position. PG&E will not unwind any financial hedges as a result of such transactions unless the electricity hedge position is above the operating target range. The upper operating targets thus serve as a threshold for unwinding hedges should non-hedging events push the portfolio hedge position above the upper operating targets. Figure Appendix B-1 and Table Appendix B-1 show the electricity and gas operating targets.

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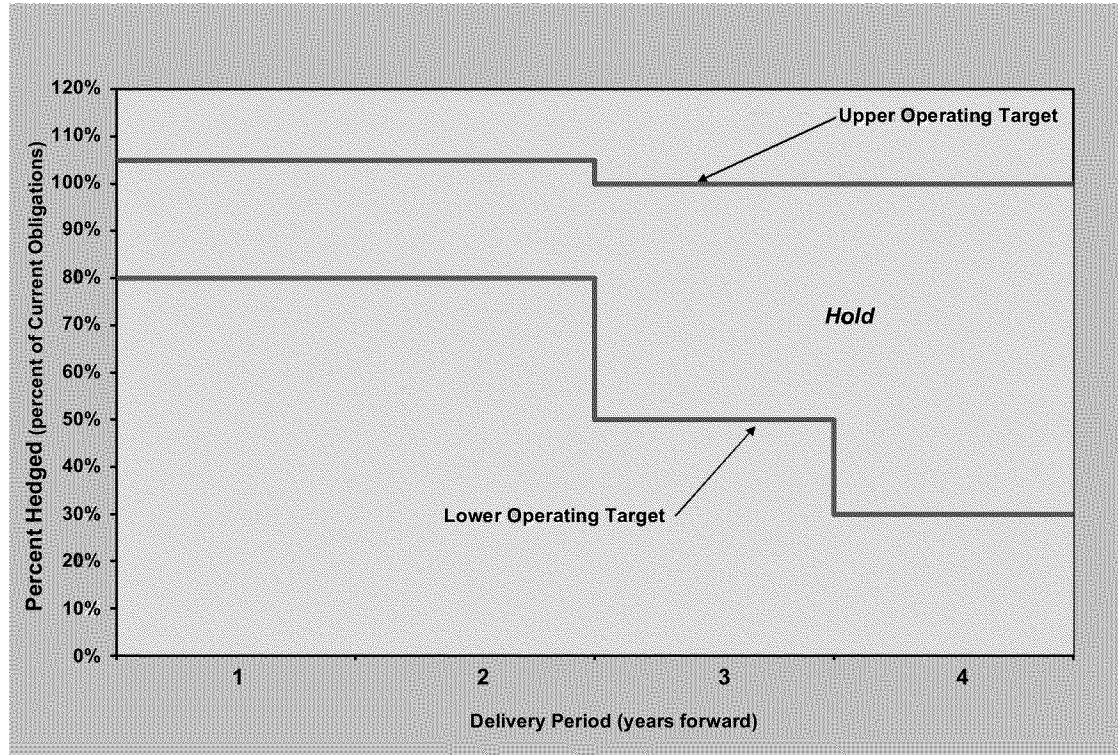
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**FIGURE APPENDIX B-1  
 PACIFIC GAS AND ELECTRIC COMPANY  
 ELECTRIC PORTFOLIO OPERATING TARGETS FOR ELECTRICITY AND GAS HEDGING FOR  
 CALENDAR YEARS 1 TO 4  
 (PERCENT)**



**TABLE APPENDIX B-1  
 PACIFIC GAS AND ELECTRIC COMPANY  
 ELECTRIC PORTFOLIO OPERATING TARGETS FOR ELECTRICITY AND GAS HEDGING  
 FOR CALENDAR YEARS 1 TO 4  
 (PERCENT HEDGED)**

Line No.	Operating Target	Year 1	Year 2	Year 3	Year 4	Year 5
1	Lower Bound Target	80%	80%	50%	30%	n/a
2	Upper Bound Target	105%	105%	100%	100%	n/a

PG&E derived the lower operating targets through an iterative process using a TeVaR model. PG&E calculated its projected 1-12 month and 13-24 month TeVaR using a range of operating targets for years 1 through 3. PG&E continued this process until it found a set of operating targets that would maintain 1-12 month TeVaR below or near the

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Customer Risk Tolerance for months 1 through 12 at the 95% confidence interval. PG&E set the operating targets for year 4 to maintain the same progressive steps (*i.e.*, operating targets are greater for periods closer to delivery than for periods that are further in the future).

The electricity position is well hedged in the near-term as a consequence of the need to contract for operationally flexible, dispatchable resources and reserve capacity, combined with the must-take resources in the portfolio. In fact, even when in balance over an annual period, the electricity position can be long during certain seasons depending on the make-up of the resources in the portfolio. Often times the electricity position may change due to variable hydro or temperature conditions going forward. In such cases it may be prudent to be slightly long going into the period of uncertainty to avoid having to procure additional quantities should unfavorable circumstances arise. Because the electric portfolio can be long in this manner, it is necessary to adopt operating targets for the long side as well as the short side of the open position. The dual-sided (both short and long) nature of the electricity position creates the need for an operating target range to manage the electricity price risk. On the gas side, considering position fluctuations, it is conceivable that the gas position could be long also. If such a position fluctuation was transitory, it may be desirable to not unwind a hedge and thus a temporary long position above 100% could be acceptable.

To deal with the possibility of the hedge positions becoming long, PG&E's hedging plan uses a 105% upper operating target to manage the long side of the position through the prompt year. This is consistent for both gas and electric positions. This range provides flexibility to manage position fluctuations in the near-term. Beyond 12 months, where it is even more difficult to determine if there will be changes to the electric portfolio position, from either the load side (returning load) or the resource side (contract defaults, extended outages, dry hydro years, etc.), the upper operating target of 105% is extended through year 2.

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PG&E will review these operating targets as market conditions warrant and at least annually. PG&E will present its annual review of its operating targets to its Procurement Review Group ("PRG") in the fall of each year. Upon adoption, the operating targets are set for the following year; that is they roll forward year-by-year. This is consistent with the seasonal nature of the gas and electricity hedging products.

## **C. ELECTRICITY HEDGING PLAN**

### **1. Management of Physical Supply Versus Financial Price Risk**

With the development of commodities exchanges and the implementation of CAISO's Market Redesign & Technology Upgrade ("MRTU"), financial and physical forward markets are both robust, thus allowing PG&E to manage the Electric Portfolio's price (financial) risk and physical reliability to different objectives. PG&E's objectives for physical supply management are reliability, flexibility and the least-cost dispatch of its portfolio of resources. PG&E's objectives for electricity price risk management are to reduce the exposure of its electric portfolio to electricity prices, to manage TeVaR within Commission-approved customer risk tolerance levels, and to stabilize electric rates.

### **2. Electricity Price Risk Management Strategies**

PG&E may procure electricity products to manage other aspects of the electric portfolio besides price risk management, such as for operational flexibility. These transactions may also affect the electricity hedged position. The default policy will be that long financial (or physical) positions in electricity will not be unwound, unless they fall outside the upper operating targets identified in Section B.

Even by managing the portfolio within operating targets, there can be events that either cause the net open position to go beyond operating targets immediately, or have the potential

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to quickly cause large deviations from the operating targets. Examples of such events are extended force outages of major resources, major market disruptions, adverse hydro precipitation conditions and defaulting contracts. In such cases, PG&E may temporarily manage the portfolio outside the established operating targets until corrective action is taken to reduce the impact on the portfolio. In addition, it may be necessary for the electric position to be outside its operating targets because an offsetting gas position is balancing the portfolio. PG&E will also maintain the following exceptions to maintaining the electricity open position within the operating targets:

- Significant market price changes;
- Significant load and resource changes;
- Credit limitations; and
- Lack of market liquidity or counterparties.

Due to MRTU and increased imports, PG&E's congestion (basis) risk has increased. PG&E will participate in CAISO's congestion revenue rights ("CRR") allocation and auction process and continue to evaluate other appropriate mechanisms for hedging this risk.

### **3. Electricity Hedging Product Mix**

Forward period hedges will primarily be financial options subject to an annual cap on option premiums. Product mix strategy is discussed in detail in Section E which describes a combined electric and gas product mix strategy.

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#### **4. Execution Strategies for Electricity**

Because electricity and gas markets trade products with different tenors, the ability of the products to cover the period beyond 12 months is slightly different. For the prompt year, the electricity positions will be managed at the monthly and quarterly level with peak and off-peak subperiod resolution. Beyond the prompt year, the position will likely be managed with quarterly strips for the second year and in calendar strips thereafter. Management of the position some years forward may also use quarterly strips for the summer period as such products are more frequently traded. For example, in August 2009, the open positions for the prompt year will be managed mainly at the monthly and quarterly level. September 2010 may be managed as either as part of a Q3-2010 strip or as an individual month, depending on the market and other Q3-2010 positions. The last three months of 2010 would likely be managed as a Q4-2010 strip, 2011-2012 would then very likely be managed at the calendar year level, though some Q3 transactions might be included.

To the extent that financial positions in electricity become prominent, the hedging program will be similar to that used for gas hedging in that there will be a ratable execution program over the entire year, unless the electricity strategy is also driven by a physical supply strategy where the pricing is embedded in the physical products, or the products are lumpy (electric physical transactions can come in large quantities per transaction, particularly if they are plant or unit specific).

#### **D. GAS HEDGING PLAN**

PG&E developed its gas hedging plan with the following objectives. First, gas hedging should be consistent and integrated with PG&E's long-term procurement plans. Second, the plan should be complementary to PG&E's Gas Supply Plans for California Department of Water Resources ("DWR") DWR Tolling Agreements. Finally, the plan should serve as a framework for Commission compliance review through the quarterly procurement transaction reports and annual Energy Resource Recovery Account ("ERRA") filings.

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## **1. Management of Physical Supply Versus Financial Price Risk**

PG&E manages physical gas supply separate from gas price risk because the market for both types of products are robust and because the objectives for managing physical supply and gas price risk are different. PG&E's objectives for physical supply management are reliability and flexibility. PG&E's objectives for gas price risk management are to reduce the exposure of its electric portfolio to gas prices, to manage TeVaR with Commission-approved customer risk tolerance levels, and to stabilize electric rates.

## **2. Proposed Gas Price Risk Management Strategies**

PG&E discussed its financial operating targets, which apply to both electricity and gas positions, in Section B above.

As with the electricity position, there can be events that either cause the gas open positions to go beyond operating targets immediately, or have the potential to quickly cause large deviations from the operating targets. Examples of such events are addition of non-gas resources to the portfolio, major market disruptions, and above normal hydro conditions. In such cases, PG&E may temporarily manage the portfolio outside the established operating targets until corrective action is taken to minimize the impact on the portfolio.<sup>3</sup> In addition, it may be necessary for the gas position to be outside its operating targets because an offsetting electric position is balancing the portfolio.

This plan extends PG&E's gas basis hedging time horizon from four seasons forward<sup>4</sup> to six seasons forward.

In order to maintain basis hedges for delivery periods at least 24-months forward and with the execution strategy discussed in Section D.4, PG&E must execute gas basis hedges for

<sup>3</sup> The decision to unwind a gas long position will be based on the size of the position relative to operating targets, the overall portfolio position, the length of time the position has been outside the target, and anticipated changes in the portfolio that may correct the position. PG&E will normally unwind such a position over time.

<sup>4</sup> AL 2775-E, PG&E Electric Portfolio Gas Hedging Plan Update 2006-1, p. 9.



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delivery 36-months forward (6 seasons). This is because basis hedges for the first 12 months of delivery periods will settle between hedging plan updates. Based on recent trading experience, PG&E is confident that the market for gas basis products is sufficiently liquid for trading up to 3-years forward.

PG&E's gas basis hedging operating targets are shown in Table Appendix B-2:

**TABLE APPENDIX B-2**  
**PACIFIC GAS AND ELECTRIC COMPANY**  
**GAS BASIS OPERATING TARGETS FOR YEARS 1 TO 5**  
**(PERCENT HEDGED)**

Line No.	Operating Target	Year 1	Year 2	Year 3	Year 4	Year 5
1	Lower	80%	80%	50%	n/a	n/a
2	Upper	105%	105%	100%	n/a	n/a

**3. Incremental Product Mix**

PG&E will replace its fixed product mix strategy with a combined electric and gas product mix strategy based on an annual cap on option premiums. Product mix strategy is described in detail in Section E.

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#### **4. Execution Strategy**

PG&E's execution strategy continues to be a single-phase execution strategy where the proposed operating targets and product mix described below will be implemented ratably over a calendar year or remainder of a calendar year (for mid-year plan updates). The hedges for near-term delivery periods will be

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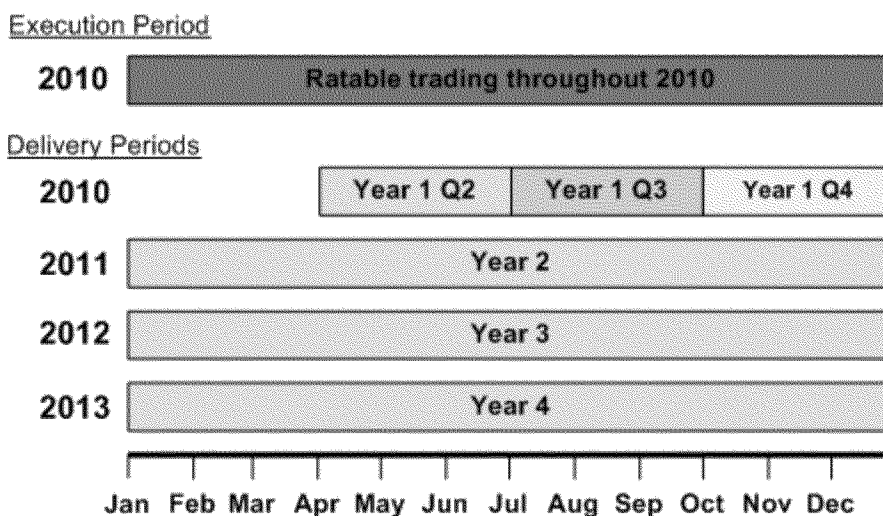


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executed first. For example: 2010 trades for delivery periods the second quarter of that year will be spread from January to March 2010 whereas 2010 trades for delivery periods in 2011 and beyond will be spread from January to December 2010. The benefit of this execution strategy is reduced market timing risk by applying a strategy similar to “dollar-cost averaging.”<sup>5</sup> The execution timeline and delivery periods are illustrated in Figure Appendix B-2.

**FIGURE APPENDIX B-2  
 PACIFIC GAS AND ELECTRIC COMPANY  
 GAS HEDGE EXECUTION TIMELINE AND DELIVERY PERIODS TO BE HEDGED**



**E. ELECTRIC AND GAS PRODUCT MIX STRATEGY**

PG&E’s product mix strategy is to use a mix of fixed-for-floating swaps and call options subject to an annual limit on option premiums of \$180 million. Option premiums will be allocated between electric and gas positions and among forward delivery years for the

<sup>5</sup> Dollar cost averaging is “investing equal amounts of money at regular intervals. The money deducted from your paycheck if you participate in your company’s 401(k) program is an example of dollar cost averaging. Theoretically, you will buy more shares when the price of your investment has declined and fewer shares when the price has risen. This may lead to an overall cost basis that is lower than the average price per share.” See *The Motley Fool Glossary*, <http://www.fool.com/school/Glossary/glossarya.htm>.



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entire tenor of the plan. Any positions not hedged with options up to the lower operating targets will be hedged with fixed-for-floating swaps.

Electric financial options will have option deltas ranging from 10% to 30%, gas financial options will have option deltas ranging from 30% to 40%. Electric option deltas are lower because the portfolio has sufficient physical option positions with higher deltas. The gas portion of the portfolio has no physical options so the higher deltas are needed to provide a reasonable balance between position coverage and option premium outlays.

Option premiums will be allocated by calendar year delivery periods and between electric and gas for each year. The allocation method is to assess the "need" for options in the portfolio for each delivery year and then divides the premiums in each calendar year by the "need" for option positions by commodity. For the purposes of this allocation, "need" is defined as the total option premiums required to bring the actual portfolio hedged position for electricity or gas up to the lower operating targets. This option premium allocation will be revised quarterly.

Once the option premiums have been allocated between electric and gas for each delivery year, PG&E will calculate the size of the position covered by the options. If the option allocation leaves any delivery period short of the lower operating target, PG&E will use fixed-for-floating swaps to bring those positions up to that target.

Normally PG&E will use fixed-for-floating swaps that require collateral or margin postings. If PG&E determines that customer costs would be no higher by using margin-free swaps than by financing the electric portfolio's collateral and/or margin requirements through short-term financing, then PG&E would use margin-free swaps.

## **F. LIQUIDITY MANAGEMENT STRATEGY**

PG&E's liquidity management strategy places an explicit limit on the financial resources available to the electric portfolio for credit and margin/collateral posting requirements in support of physical procurement and financial hedging. It is intended to

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insulate funding of ongoing non-procurement utility operations from extreme market events that impact the electric portfolio.

### 1. Liquidity Management Structure

This strategy is operationalized for the electric portfolio through a liquidity measure, a liquidity limit, a liquidity trigger, and a liquidity warning level defined as follows (Figure Appendix B-3):

- **The Liquidity Limit** is the amount of PG&E's short-term financing in place and allocated to the electric portfolio for credit and margin posting requirements in support of physical procurement and financial hedging.
- **The Liquidity Measure** is the total impact on PG&E's liquidity of Company's use of financing for the needs of electric portfolio. It is the sum of the value of secured credit lines, net posted margin and collateral and potential future exposure. Future potential exposure is a measure of future margin and collateral postings measured at the 95th percentile and a 30-day holding period.<sup>6</sup> See Figure Appendix B-3.
- **The Liquidity Trigger** provides a safety buffer intended to prevent the electric portfolio from reaching the Liquidity Limit. When the Liquidity Measure exceeds the Liquidity Trigger, PG&E will immediately discontinue execution of hedging products that require collateral and or margin postings. In addition, PG&E will take a series of actions defined in Section F.2 below.<sup>7</sup>
- **The Liquidity Warning Level** provides a warning that the Liquidity Measure is approaching the Liquidity Trigger. When the Liquidity Measure exceeds the Liquidity Warning Level, PG&E will take a series of actions defined in Section F.2 below.

<sup>6</sup> The holding period is the number of calendar days required to mitigate the potential exposure. In other words, PG&E could liquidate the positions to reduce the potential exposure within 30 calendar days.

<sup>7</sup> For example, when the structure stipulates that PG&E will immediately discontinue execution of hedging products that require collateral and/or margin postings, PG&E would continue to hedge using authorized products such as margin-free swaps, which do not require collateral and/or margin postings. This is not the same concept as reducing margin postings amounts to avoid exceedance of the Liquidity Trigger. Using margin-free swaps is likely to cost a bit more than using standard swaps that require posting of collateral and/or margin; the Liquidity Trigger is a way of systematically and *a priori* determining that the extra cost is worthwhile for the liquidity gained.

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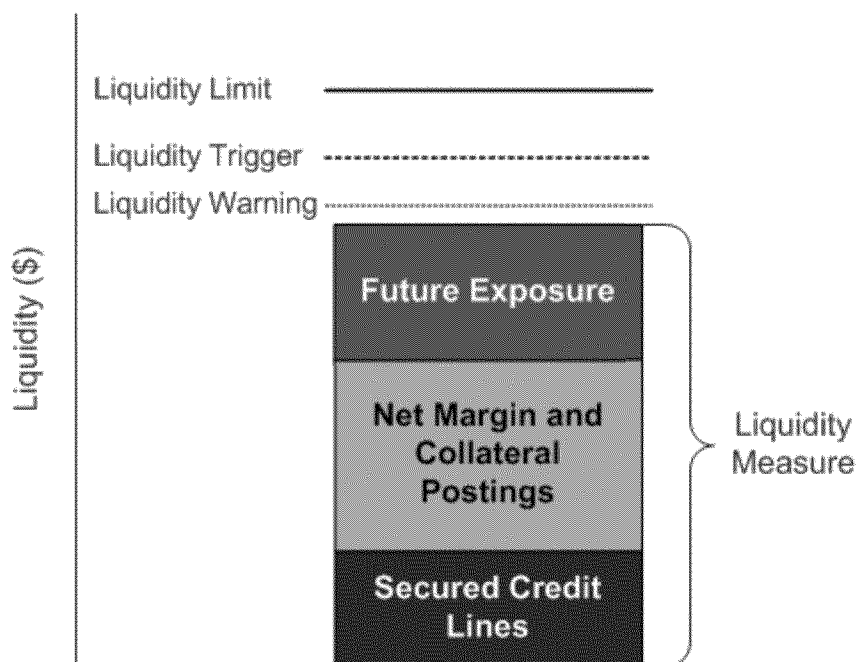
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**FIGURE APPENDIX B-3  
PACIFIC GAS AND ELECTRIC COMPANY  
LIQUIDITY MANAGEMENT STRUCTURE**



Based on the credit facilities that PG&E currently has in place, the liquidity parameters are set as follows:

- Liquidity Limit: \$1.25 billion
- Liquidity Trigger: \$1.1 billion
- Liquidity Warning Level: \$1.0 billion

Whenever PG&E changes the amount of liquidity allocated to the bundled electric portfolio, these parameters will be modified accordingly, and submitted to CPUC for approval. At a minimum, these parameters will be reviewed annually along with the electric portfolio hedging plan.

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## 2. Liquidity Measurement and Reporting

PG&E will calculate the Liquidity Measure on a monthly basis. If the Liquidity Measure exceeds the Liquidity Warning Level, PG&E will follow the notification and action procedure outlined in the following table.

**TABLE APPENDIX B-3  
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 LIQUIDITY MANAGEMENT STRUCTURE**

Liquidity Levels	Notification and Actions Required
1) <b>\$1.0 billion:</b> Liquidity Warning Level	PG&E will notify its PRG within 4 business days. PG&E will switch from monthly to weekly calculation of its Liquidity Measure. PG&E will closely monitor the Liquidity Measure and consider possible mitigation strategies.
2) <b>\$1.1 billion:</b> Liquidity Trigger	PG&E will notify its PRG and the CPUC's Energy Division within 4 business days. PG&E will immediately discontinue execution of hedging products that require collateral and or margin postings. PG&E will hold a meeting with the PRG within 15 business days to discuss PG&E's proposed liquidity management strategy (discussed below).
3) <b>\$1.25 billion:</b> Liquidity Limit	PG&E will notify its PRG and the CPUC's Energy Division within 2 business days. PG&E will implement strategies to resolve the limit exceedance.

## 3. Liquidity Mitigation Strategies

There are a number of strategies that PG&E could implement to reduce its Liquidity Measure. The following strategies are indicative of the types of strategies that PG&E would consider to reduce its Liquidity Measure:

- Replacement of existing fixed-for-floating swaps with margin-free fixed-for-floating swaps, thus relieving PG&E of the requirement to post collateral for those positions that are replaced.
- Novating existing fixed-for-floating swap positions from a counterparty with whom PG&E has exhausted its unsecured lines of credit to a counterparty willing to provide a line of credit, normally for a fee.

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- Liquidate (sell) existing fixed-for-floating swap positions cleared through an exchange or with an over-the-counter counterparty under a secured credit line.

If PG&E liquidates an existing out-of-the-money fixed-for-floating swap position, it will realize a loss that was previously unrealized and the amount of the loss will be recovered through ERRA. In addition, the underlying position that was hedged by this position will no longer be hedged, and a subsequent increase in commodity prices could result in higher costs which would also be recovered through ERRA. If PG&E were to liquidate a significant volume of such positions, PG&E's ERRA balance could become undercollected to the point of triggering a rate increase.

If PG&E liquidates existing fixed-for-floating swap positions and does not replace them with margin-free hedges, it will also increase PG&E's TeVaR. It is conceivable that PG&E could be required to liquidate existing swap positions to reduce its Liquidity Measure at a time when margin-free hedge products are not available in the market. Under this circumstance, PG&E would be unable to manage TeVaR.

In addition to considering strategies that reduce its Liquidity Measure, PG&E could also implement strategies to increase its Liquidity Limit. Such strategies involve short-term debt financing pursuant to PG&E's Short-term Financing Authority which was recently approved by the Commission (D.09-05-002).

#### **G. ELECTRICITY AND GAS HEDGING PLAN UPDATES VIA ADVICE LETTER**

Should market conditions change to the point of necessitating modifications to PG&E's electricity or gas hedging plans, PG&E will file an advice letter with the Commission requesting a change using a process similar to the advice letter process approved in Resolution E-3951. In that resolution, the Commission stated:

While PG&E's plan provides for some degree of flexibility and specifies that it will consult with its PRG during its execution, the utility may find that

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modifications to the plan should be undertaken. Accordingly, PG&E is authorized to file minor modifications to the hedging plan approved in this resolution through an advice letter filing. We delegate authority for the review

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Issued by  
**Brian K. Cherry**  
Vice President  
Regulatory Relations

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**Pacific Gas and Electric Company**  
San Francisco, California

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and, if appropriate, approval of any such advice letters to the Energy Division. Prior to filing any such advice letters, the utility shall present its proposals to its PRG in an effort to mutually resolve any PRG concerns.

The Energy Division may reject the advice letter if PG&E seeks modifications that the Energy Division considers are not minor or on other procedural grounds.

At minimum, a gas hedging plan modification advice letter should include a detailed description of the proposed changes, supporting analysis, quantification of the proposal's costs and benefits and demonstrate how the proposal is consistent with the Commission's directives and PG&E's Commission approved procurement plans.<sup>8</sup>

PG&E will present an annual review of its electricity and gas hedging strategies to its PRG in the fall of each year.

#### **H. ELECTRICITY AND GAS HEDGING IN THE LONG TERM (BEYOND FOUR YEARS)**

Beyond four years, PG&E is not proposing any formal gas and electricity financial hedging strategy. This does not imply that risks are not hedged beyond four years. There may be circumstances where non-portfolio risk issues govern (such as contracting for specific units to ensure longer-term planning reserve margins) and may lead to some level of price risk hedging for such delivery periods. PG&E will make advice letter filings with the Commission if there is a need for strategies to financially hedge the electric portfolio further out than four years.

#### **I. ELECTRICITY AND GAS HEDGING PLAN IMPLEMENTATION**

Because the electricity and gas hedging plan involves a number of elements and transactions, PG&E will not be able to immediately, upon Commission approval, achieve all of the targets specified in the plan. PG&E will implement the electricity and gas hedging plan in a manner that ensures the proposed targets are met within an appropriate period of time.

<sup>8</sup> Res. E-3951, p. 6.