



Appendix F

Green House Gas/AB32 Compliance Plan

A. Introduction

AB 32 establishes a goal of reducing California's GHG emissions to the 1990 level by 2020. The statute grants CARB broad authority to regulate GHG emissions to reach this target. CARB's Scoping Plan includes a recommendation that California adopt a portfolio of emissions reduction measures, including a California GHG cap-and-trade program that can link with other programs to create a regional market system.^{1/}

In October, 2011, CARB released its *Final Regulation Order*, which was approved by its Board and by the Office of Administrative Law in December, 2011.^{2/} The CARB regulations will create a GHG emissions allowance cap-and-trade system, with compliance obligations in the electricity sector applicable to "first deliverers of electricity." Generally, first deliverers of electricity are electricity generators inside California that emit more than 25,000 metric tons of GHGs and importers of electricity from outside of California. The regulation requires that first deliverers of electricity, except publicly-owned utilities, purchase all of the allowances and offsets required to meet their compliance obligations. The CARB regulations became effective January 2012 and the GHG emissions allowance

^{1/} CARB Resolution 11-32 at 3.

^{2/} The CARB documents referenced are available at:
<http://www.arb.ca.gov/regact/2010/capandtrade10/capandtrade10.htm>.



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cap-and-trade system (the "Cap-and-Trade Program"), compliance obligation is currently scheduled to begin January 1, 2013.

With implementation of the Cap-and-Trade Program, SDG&E will face GHG cost exposure for its UOG combined cycle generation facilities and peaking generation facilities that exceed 25,000 metric tons of emissions. In addition, SDG&E will have GHG obligations for imported electricity purchased under existing long-term contracts and imported spot market purchases. Lastly, SDG&E will have contractual obligations for GHG compliance responsibility for some bilateral contracts including generation tolling agreement contracts.

B. Compliance Obligation

(i) Requirements

Every November following an entire year covered by the program, SDG&E and all participants in the GHG Cap-and-Trade Programs must surrender compliance instruments covering at least 30% of their respective emissions for the previous calendar year. Additionally, the November following the final year of a compliance period, SDG&E must surrender the balance of compliance instruments equal to the remainder of its actual GHG emissions for the full compliance period.

(ii) Compliance Periods

Compliance periods are currently established as follows:

- 2013-2014 (electricity and industrial only)
- 2015-2017 (fuel providers added)
- 2018-2020



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(iii) Allowance Accounts

SDG&E will have three accounts containing its GHG allowances:

- Limited Use Holding Account: The Limited Use Holding Account will hold allowances allocated to SDG&E by CARB that can only be sold in the auction.
- Holding Account: Allowances and offsets acquired by SDG&E go into its Holding Account. Allowances are transferred from the Holding Account into SDG&E's Compliance Account to meet its GHG obligations.
- Compliance Account: Allowances in the Compliance Account are "retired" and can no longer be traded. SDG&E must meet its obligation for each multi-year Compliance Period by acquiring allowances and offsets and retiring them, with at least 30% of its annual obligation retired in November following each compliance year.

Any additional allowances remaining in SDG&E's Holding Account after its GHG emissions obligations have been met can be sold to other parties or "banked" for future use – *i.e.*, unused allowances are carried forward to the next compliance period for use for future compliance.

C. Products for meeting GHG Obligations

CARB has identified two types of tradable instruments that it may issue: (i) California GHG Emission Allowances (allowances); and (ii) California Offset Credits (offsets). These compliance instruments are matched against emissions to satisfy a compliance obligation. SDG&E plans to



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purchase allowances and offsets using various methods as listed here and discussed below: the CARB Auctions, the CARB Price Containment Reserves, allowance futures, allowance forwards, offset forwards and bilateral transactions through an RFO. SDG&E may also sell allowances and/or offsets as needed.

(i) Allowances

Allowances will effectively serve as permits to emit GHGs. All allowances are distributed by CARB to compliance entities or placed into the auction to be procured by entities.

SDG&E will receive free allowances through the life of the Cap-and-Trade Program, but the allowances distributed to SDG&E, like other California IOUs, must be consigned from the Limited Use Holding Account to be sold in the auction, and SDG&E must use all of the proceeds to benefit its ratepayers.

(ii) Offsets

An offset is a credit for a verified emission reduction from a source outside the Cap-and-Trade Program, with the intention of reducing emissions in sectors not captured in the Cap-and-Trade Program. These offsets can be in California or in North America in non-covered sectors such as agriculture, forestry, and consumer products. CARB will develop the procedures to demonstrate verified emission reductions; once approved, an offset can be used in lieu of allowances.

There currently exist four compliance offset protocols included within the Cap-and-Trade Program.

1. Livestock Manure (Digester) Projects Protocol
2. Urban Forest Projects Protocol
3. U.S. Ozone Depleting Substances Projects Protocol
4. U.S. Forest Projects Protocol



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CARB has set a limit of 8% of a participating entity's GHG compliance period obligation that can be met with offsets.

At this time, SDG&E plans to limit its purchase to the four offset types above, but may consider procuring additional types of offsets only after a formal adoption by CARB. Utilities are allowed to purchase offset types that are CARB approved and may purchase a new offset type if/when it becomes CARB-approved without the requirement of an advice letter filing to the CPUC. In addition SDG&E's purchase of offsets is conditioned on: (a) the purchase contract must require the seller of the offsets to assume the risk of invalidation and (b) the seller of the offsets must post appropriate collateral for the transaction(s).^{3/}

D. Products for Hedging and Procuring GHG Obligations

SDG&E may choose to use any of the following instruments to hedge its GHG obligations.

(i) Future Vintage Allowances

Future vintage allowances are expected to be auctioned in limited quantities in the CARB auctions. For example, 2015 allowances will be auctioned in 2012. However, these allowances may not be used for compliance before 2015. As such, SDG&E may choose to purchase future vintages if they are within 3 years of the current year.

(ii) Allowance Futures

Futures for GHGs are standardized contracts that obligate the seller to sell allowances. Because these contracts are standardized, they can be traded on exchanges and can be converted to allowances in the future. As with future vintage allowances, SDG&E may choose to purchase allowance futures only if they are within 3 years of the current year and transacted through a

^{3/} D.12-04-046. *mimeo*, pp. 43, 44, Ordering Paragraph 8.



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Commission-Approved Exchange.

(iii) Forwards of Offsets and Allowances

Forwards for offsets or allowances are also obligations to sell at a future date, but the contracts are not as standardized and would not be traded on exchanges. Forwards are an obligation to actually deliver allowances or offsets. As with futures products, forwards are not CARB transacted products and, as such, will depend on the market to develop these hedging products. SDG&E may enter into offset forwards if the contracts are structured such that SDG&E only pays after it receives the CARB-certified offsets. For purchasing either offset forwards or allowance forwards, SDG&E will conduct an RFO.

E. Transaction Methods

SDG&E plans to [REDACTED]
[REDACTED]

(i) CARB Auction

Absent a delay in commencement of the Cap-and-Trade program, it is expected that CARB will begin auctions for allowances in November 2012; with auctions to be held quarterly after that. Allowances sold in the auction may come from: (i) allowances consigned by entities; (ii) allowances not allocated to entities. Allowances sold in the future auction will come from unallocated allowances for future compliance periods.

Auction bidders will submit sealed bids. The highest bids will be cleared first, continuing to the next lowest bid until the demand for the accepted bids have been met or all the allowances have been



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sold. The price for all allowances purchased in the auction will be the lowest accepted bid. No bids will be accepted below the reserve price, which CARB has set at \$10/MTCO₂e for 2012 and 2013 Auctions. This reserve price will increase annually as provided for in CARB's Regulation.

To assure the availability of allowances, beginning in 2013, CARB will maintain a reserve of allowances called the Allowance Price Containment Reserve to be sold six weeks after each auction. For 2013, the reserves will be made available in three tiers: \$40, \$45, and \$50 (each of the prices of the three tiers will increase annually as provided for in CARB's Regulation.) The participants in the reserve auction would submit volumes in each tier. The reserves will be sold and the bidders in each tier will be awarded the bid volume, unless the volume of the tier is exceeded, in which case the allowances would be prorated amongst the bidders.

While SDG&E anticipates that it will conduct the majority of its allowance procurement through CARB Auctions and [REDACTED]

(ii) Exchanges

Exchanges ensure fair and orderly trading and allow for transparent price information. Exchanges act as an intermediary between buyer and seller, effectively becoming the counterparty for the transaction. This is the case for transactions executed through the exchange, as well as for transactions executed over-the-counter and then cleared through the exchange. Exchanges also provide protection against credit risk and alleviate both the need to extend credit and establish master trading agreements with individual counterparties. This increases the pool of potential counterparties. Thus, the ability to clear products through exchanges increases SDG&E's options in the execution of its GHG allowance strategy.



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SDG&E plans to use previously Commission-approved Exchanges to purchase allowance futures. The list of Exchanges SDG&E will use for GHG products, are included in Table 1(e) in this LTPP. To the extent SDG&E wishes to transact with any additional viable and liquid exchanges, SDG&E may seek to add these to its list of approved exchanges through the submittal of a Tier 2 Advice Letter requesting authority to use that exchange to buy or sell allowances in accordance with D.12-04-046 issued April 19, 2012. SDG&E will utilize the additional exchanges as of the date it receives authorization to add the exchanges through either a Commission resolution or Energy Division letter approving the inclusion of such exchanges.

(iii) Brokers

Brokers are the manual equivalent of electronic exchanges in that brokers have access to a wide pool of buyers and sellers, and convey pricing information to all participants, thereby creating price transparency similar to what exists on exchanges.

One reason to do transactions via a broker or direct with a counterpart is because the volumes on an exchange are standardized and not customizable.

SDG&E will only use brokers for purchases of allowances or offsets if the transaction is conducted through an RFO. SDG&E would report these transactions to the PRG.



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(iv) Direct Transactions

SDG&E may wish to transact directly with counterparties, when the pricing is equivalent or better than pricing offered through brokers or exchanges. This may be beneficial for non-liquid products that may be hard to find through a broker or exchange, or to save the transaction costs of using a broker. It is expected that offsets in the early years of the Cap-and-Trade Program will be developed mostly through brokers and direct transactions.

In the event that SDG&E finds it necessary to purchase bilaterally, (including bilateral transactions done through a broker), SDG&E will issue an RFO soliciting the applicable product(s) and consult with their PRG as appropriate during the RFO process.

F. Emissions Forecasting and Tracking

(i) Emissions Forecasting

SDG&E regularly forecasts its expected energy supply dispatch needs and will similarly track expected GHG requirements when the GHG compliance program begins. SDG&E includes its forecast in this filing and will thereafter update its forecast as outage information and actuals become available or as otherwise necessary. Updates will be filed via a Tier 2 advice letter and will be reported in the Quarterly Compliance Reports and at the quarterly PRG meetings. The latest SDG&E forecast of GHG expected costs will be incorporated into each annual ERRR forecast filing.



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In addition to the emissions from its UOG plants, some contracts, such as tolling agreements, may require that SDG&E procure compliance instruments on behalf of the generator.^{4/} [REDACTED]

[REDACTED]

[REDACTED]

As a first deliverer of electricity, SDG&E will also be responsible for *imported power that it procures out-of-state and brings across the California border*. These imports will have emissions factors as outlined in the CARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions. Emissions rates will be set before the start of the compliance period and will remain the same for the entire compliance period.

SDG&E is not required to procure GHG for purchases for the following sources of power generated in CA: renewable generation, CA market purchases, CAISO market purchases, QFs, and small peakers whose emission production was less than 25,000 metric tons/year for every year in the 2008 – 2012 period. Additionally, SDG&E is not required to procure GHG allowances for any imports delivered across state lines by other entities.

The forecast for SDG&E's GHG emissions for years 2013 – 2016 is as follows:

^{4/} CARB is currently finalizing the rules regarding the procurement of allowances and offsets for the benefit of other generators.



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SDG&E GHG Forecast								
Resource	Fuel (000 MMBtu)				GHG (000 Metric Tons)			
	2013	2014	2015	2016	2013	2014	2015	2016
Palomar								
Otay Mesa								
Desert Star								
Miramar*								
Orange Grove*								
Pio Pico								
QuailBrush								
Boardman								
Fuel-Based Total								
	GWh				GHG (000 Metric Tons)			
Imports (GWh)								
RPS Adjustment								
Forecasted Demand								
<p>* Although the Miramar and Orange Grove forecasts are below the 25,000 Metric Ton threshold, SDG&E believes that the 2012 actuals will exceed the threshold, putting those generators in compliance for at least the first compliance period.</p>								

(ii) GHG Allowance Tracking System

SDG&E will implement a GHG allowance tracking system, not only to track its expected need for allowances, but also to track the allowances and offsets SDG&E has procured and the resulting remaining open position. As with any other open position related to energy procurement, SDG&E will monitor the forward GHG allowance prices and the impact to overall procurement costs.

SDG&E is currently pursuing adding a new module to its current Energy Trading and Risk Management system that will both track SDG&E's compliance positions and aid with settlement functions.



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G. Energy Dispatch

Implementation of the Cap-and-Trade Program will result in a modification of SDG&E's decision-making for energy dispatch. The cost of GHG will be an added component to generation costs of each resource in SDG&E's portfolio, including its owned generation, generation from purchase power agreements and imported power. As the first deliverer of electricity, SDG&E is also responsible for GHG costs for energy it purchases outside of California and imports into the state. Accordingly, GHG costs will be included in decisions to purchase energy outside of the state.

In addition, the additional costs will impact overall dispatch of SDG&E resources and could impact the overall economics of generating facilities. For example, plants that have higher GHG emissions compared to other generating units being bid into the CAISO market may be less economic to run, and thus may be dispatched less often than they are today. GHG costs will be reflected in SDG&E bids submitted to the CAISO, so that SDG&E's plants will only generate when they are economic (including the GHG costs) compared to other resources bid into the CAISO market.

SDG&E will use the forward market prices to calculate GHG costs. The forward costs will provide an indication of what SDG&E expects to pay for the GHG emissions associated with generation.



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H. Procurement Strategy

Since the allowances allocated to SDG&E must be made available in the auction, SDG&E will need to procure the allowances required to meet the GHG obligations associated with the energy needs of its bundled customers. [REDACTED]

[REDACTED]

SDG&E's overall GHG emissions allowance procurement strategy will continually be reviewed and updated periodically as required.

(i) Product Mix

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

For the remainder of its compliance obligation, SDG&E will look to the products listed above and will procure the product(s) that provide the best price and method for reducing SDG&E's exposure to GHG allowance prices. Since allowances can be carried forward, procurement of allowances effectively acts as a hedge against future prices.

(ii) Volumes and Limits

SDG&E will forecast its Compliance needs for current year through current year plus three and will generate the limits as described in the LTPP decision 12-04-046.

^{5/} The "incremental and over time" hedging program involves layering on hedges over time so as to reduce overall portfolio risk.



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The SDG&E GHG procurement limit is calculated with the following formula as required in D.12-04-046 issued April 19, 2012.

$$L_{CY} = A + 100\%*(FD_{CY}) + 60\%*(FD_{CY+1}) + 40\%*(FD_{CY+2}) + 20\%*(FD_{CY+3})$$

Where "L" is the maximum number of GHG compliance instruments an IOU can purchase for purposes of meeting their direct compliance obligation.

"A" is the utility's net remaining compliance obligation to date, calculated as the sum of the actual emissions for which the utility is responsible for retiring allowances (or purchasing on behalf of a third party) up to the Current Year,^{9/} minus the total allowances or offsets the utility has purchased up to the Current Year that could be retired against those obligations. This term in the calculation ensures the IOUs are always able to buy sufficient allowance to cover any prior years' shortfalls, given that actual emissions may end up being less than forecast and/or prior decisions about how much procurement to do.

"FD" is the utility's forecasted compliance obligation", the projected amount of emissions for which the utility is responsible for retiring allowances, or responsible for purchasing on behalf of a third party, calculated using an implied market heat rate (IMHR) that is two-standard deviations above the expected IMHR consistent with the approach described by PG&E.

"CY" is the current year, i.e., the year in which the utility is transacting in the market.^{7/}

Below are the projected emissions calculated using an implied market heat rate 2 standard deviations and the associated limit for 2013.

^{9/} This would be compliance instruments with vintage years prior to the current year.

^{7/} As stated in Appendix 1 of D. 12-04-046



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SDG&E's Limits Forecast **								
Resource	Fuel (000 MMBtu) based on IMHR plus 2-Sdev				GHG (000 Metric Tons)			
	2013	2014	2015	2016	FD ₂₀₁₃	FD ₂₀₁₄	FD ₂₀₁₅	FD ₂₀₁₆
Palomar								
Otay Mesa								
Desert Star								
Miramar								
Orange Grove								
Pio Pico								
QuailBrush								
Boardman								
Fuel-Based Total								
	GWh				GHG (000 Metric Tons)			
Imports (GWh)								
RPS Adjustment								
Forecasted Demand								
SDG&E Limit for 2013 ("L₂₀₁₃")								
<p>** As per Appendix 1 of D. 12-04-046, SDG&E used an implied market heat rate plus 2-Standard Deviations to produce the forecast in this table.</p> <p>Specifically to derive the GHG limit, SDG&E employed a method consistent with the capacity limits methodology used in the LTPP Track 2 compliance filing. SDG&E calculated historical implied market heat rates, (IMHR), using SoCal Border gas price and SP-15 on and off peak forward curves from January 2009 – March 2011. The standard deviation of the IMHR was calculated. and Two standard deviations was then calculated by multiplying 1.645 times the standard deviation for a single-tail calculation. The result was added to the maximum IMHR value in the data set to derive the upper limit. The ratio of the upper limit to the IMHR was then applied to the current SP-15 forward curves to derive new forward price curves, used as input to the production cost model to generate a new dispatch and the GHG associated with the IMHR upper limit. The resulting limit was calculated based on the decision's formula with "A" = 0 since at the beginning of the program, there is no existing compliance obligation.</p> <p>$L_{2013} = A + 100\%*(FD_{2013}) + 60\%*(FD_{2014}) + 40\%*(FD_{2015}) + 20\%*(FD_{2016})$</p>								

The calculated limits and emission forecasts will be updated and filed via Tier 2 advice letter as necessary.



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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

This

strategy will further be adjusted year-to-year as necessary to reflect actual prices and volume of allowances procured; similar to what is done today for SDG&E's fuel and power hedging strategies.

(iii) Risks for Allowance positions

SDG&E procurement volumes are based on forecasts, and as such SDG&E may at times be either over or under-procured with respect to allowances and/or offsets. This could happen because the actual generation dispatch will not perfectly match the forecasted dispatch due to changes in demand, plant outages, dispatch of generation resources and/or energy market conditions. There are risks associated with having either a short or a long position. If SDG&E has a short position, SDG&E would be at risk of a price spike occurring at the end of the compliance period (2014 for the first compliance period). Also, if SDG&E were to fail to meet its obligations, the penalties for being short are four times the cost of short allowances from the next compliance period plus any added CARB fines, which are currently not well-defined.



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If SDG&E has a long position, in addition to the risk that prices could decline, there is a risk that federal legislation pre-empting the California Cap-and-Trade Program could be adopted, which might result in allowances in SDG&E's holding account becoming worthless. CARB has indicated that it will attempt to protect participants in the Cap-and-Trade Program in the event of passage of federal legislation, but there is nothing specific in the CARB regulations addressing federal preemption.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

(iv) Hedging GHG Exposure in the Price of Energy

SDG&E may also purchase and sell compliance instruments for the sole purpose of hedging their GHG exposure embedded in the price of energy. [REDACTED]

[REDACTED]

[REDACTED]

The SDG&E GHG financial exposure purchase limit is calculated with the following formula as required in D.12-04-046 issued April 19, 2012.

$$FL_{CY} = 20\%*(FE_{CY}) + 10\%*(FE_{CY+1}) + 5\%*(FE_{CY+2}) + 2.5\%*(FE_{CY+3}) - B$$



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Where "FL" is the maximum number of GHG compliance instruments that a utility can purchase for purposes of hedging their financial exposure to GHG costs.

"FE" is an estimate of the utility's financial exposure to GHG costs that will, or are anticipated to be, embedded in the price of energy, calculated based on the tons of CO2 for which a given IOU believes it will bear the costs through an embedded cost of carbon as reflected in energy prices. This amount does not include the costs the IOUs anticipate incurring as a result of their direct compliance obligation as "direct compliance obligation" is defined above.

"CY" is the current year, i.e., the year in which the utility is transacting in the market.

"B" is the utility's net purchases of GHG compliance instruments to date for hedging purposes, calculated as the total purchases of GHG compliance instruments for purposes of hedging an IOU's Financial Exposure up to the Current Year minus those GHG compliance instruments sold up to the Current Year. This term helps ensure that if the IOUs have hedged a lot in prior years and those hedges didn't pay out (e.g. the price they saw in the market for carbon stayed below what they paid for a compliance instrument and so they didn't sell the instrument) that gets factored into the amount of additional hedging they are allowed to undertake.^{8/}

[REDACTED]

[REDACTED]

[REDACTED]

^{8/} As stated in Appendix 1 of D. 12-04-046



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SDG&E GHG Exposure in Energy Forecast***								
Resource	GWh				GHG (000 Metric Tons)			
	2013	2014	2015	2016	FE2013	FE2014	FE2015	FE2016
Market Purchases								
Existing GHG								
Hedges								
Sub Total								
SDG&E Limit for 2013 ("FL2013")								
<p>*** As per Appendix 1 of D.12-04-046, the resulting limit was calculated based on the decision's formula with "B" = 0 since at the beginning of the program, there are no existing GHG hedges.</p> <p>$FL2013 = 20\%*(FE2013) + 10\%*(FE2014) + 5\%*(FE2015) + 2.5\%*(FE2016) - B$</p>								