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Witnesses:

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An *EDISON INTERNATIONAL* Company

(U 338-E)

EDISON SMARTCONNECT™ DEPLOYMENT FUNDING AND COST RECOVERY

Volume 4: Demand Response

Before the

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EDISON SMARTCONNECT™ DEPLOYMENT FUNDING AND COST RECOVERY

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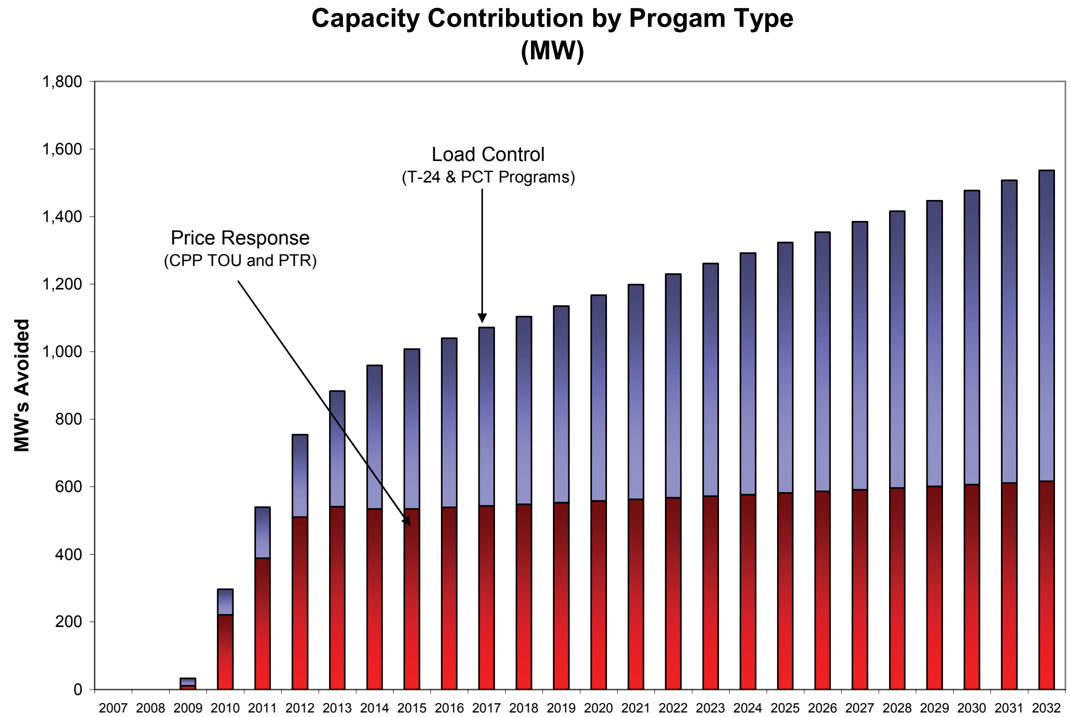
I.

INTRODUCTION

The purpose of this testimony is to provide an overview of the dynamic rates and demand response programs that SCE expects will be available with Edison SmartConnect™, and to discuss SCE's demand response objectives, guiding principles, key sensitivities and other relevant information. Edison SmartConnect™ presents a unique opportunity to provide SCE's customers with new energy management alternatives that will enable them to reduce energy costs by using electricity more effectively and efficiently. By providing access to near real-time energy use and costs and enabling dynamic pricing options for residential and small / medium business customers with price signals closer to actual costs than tiered or flat rate structures, Edison SmartConnect™ will be instrumental in managing peak consumption by providing an incentive for customers to shift some of their usage to off-peak hours. Edison SmartConnect™ enables a range of dynamic rate design options that can improve customer acceptance and satisfaction. Figure I-1 shows the expected reductions in peak demand as a result of the Edison SmartConnect™ enabled load control and price response.

Figure I-1
Estimated Peak Demand Reduction for Price Response and Load Control Programs



Chapter I of this volume is introductory in nature. Chapter II provides the background information that has shaped and influenced SCE's demand response and dynamic rate design, discusses the objectives and guiding principles utilized to design SCE's program, and sets forth a summary of SCE's demand response programs and dynamic rate designs.

Chapter III describes the load control programs, including Peak-Time-Rebate, Programmable Communicating Thermostats (PCTs), and Title 24 Program, and the dynamic rates, including Critical Peak Pricing (CPP) and Time-Of-Use (TOU), all of which SCE expects will be available with Edison SmartConnect™. This chapter also includes program details including participation rates, price elasticities, bill impacts, assumptions, compatibility with other demand response programs, and other items.

As discussed in Exhibit SCE-2, SCE seeks authorization to implement the Edison SmartConnect™ PCT Program as Edison SmartConnect™ meters are installed. SCE also plans to offer existing TOU and CPP rates for Edison SmartConnect™ customers pending authorization of revised TOU and CPP rates, which SCE plans to seek in Phase II of its 2009 GRC. These rates are discussed in detail in Chapter III and in the appendices of this volume.

Demand response tariff and program proposals and assumptions from previous SCE AMI business case filings are superseded by the program details described in this volume.

II.

DEMAND RESPONSE POLICIES AND OBJECTIVES

A. Guiding Principles

SCE's ultimate objective is to design a comprehensive program that meets the Commission's objectives for demand response as defined in Energy Action Plan II[1] and further addressed in Working Group 3.[2] SCE has reviewed the Commission approved AMI programs of Pacific Gas and Electric Company (PG&E) and San Diego Gas & Electric Company (SDG&E) in researching the program characteristics that would best suit SCE's customers and meet regulatory policy goals. In so doing, SCE has developed the following principles for guidance and direction in developing a balanced, comprehensive program.

1. Encourage Demand Response Through Dynamic Pricing

Tariffs should encourage demand response through an appropriate differential between on-peak and off-peak prices. The Statewide Pricing Pilot demonstrated that a higher differential encourages customers to reduce usage during peak periods. Dynamic pricing includes rates differentiated by time of day and price increases or rebates on critical peak days when power resources are limited.

2. Promote Rate Equity

Dynamic rates should reflect equitable cost allocation amongst different customer segments. To the extent possible, rate group cross-subsidies should be minimized while adhering to public policy objectives.

3. Maximize Customer Participation

To achieve significant demand response, as many customers as possible should be exposed to dynamic pricing and should be encouraged to participate in these programs. However,

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[1] Energy Action Plan II, Implementation Roadmap for Energy Policies, dated September 21, 2005, by the California Energy Commission, the California Public Utilities Commission (the Commission).

[2] Rulemaking 02-06-001 of the Commission created Working Group 3, which was assigned to address issues surrounding possible expansion of the advanced metering infrastructure to include all customers.

dynamic pricing tariffs should be designed to minimize adverse customer impacts and to simplify the rate structure wherever possible.

4. Complement Load Control

Dynamic rates should complement load control programs rather than compete with them. In other words, usage reductions in response to dynamic pricing should work in conjunction with future and existing load control programs to decrease overall usage during peak periods.

5. Enable Customer Choice

Rate designs should offer adequate customer choice. Thus, dynamic rates should be adaptable, flexible and encourage demand response from customers.

6. Consistent with Law and Public Policy

Rate designs must be compliant with the law and consistent with the energy policies of the state, including AB1-X, the Energy Action Plan II, and other regulatory directives.

7. Dynamic Rates Should Be Revenue Neutral

Dynamic rates should be designed to be revenue neutral. However, optional rates, when combined with a knowledgeable customer population, could lead to revenue deficiencies. Deficiencies should be recovered from and surpluses should be returned to customers through an appropriate balancing account.

These guiding principles assist SCE in focusing on attaining a balanced solution to demand response. They recognize that the highest attainable level of demand response may not be optimal if it runs counter to public policy, inhibits customer choice, results in revenue deficiencies, or otherwise adversely impacts SCE's customers.

B. SCE Objectives for Demand Response Programs and Dynamic Rates

SCE has incorporated the Commission's guidance on demand response parameters and assumptions from PG&E's and SDG&E's AMI proceedings into its demand response program plans for Edison SmartConnect™. Specifically, the Commission approved PG&E's reliance on voluntary enrollment in TOU and CPP rates, and SDG&E's reliance on a peak-time rebate for residential customers and CPP rates for commercial and industrial (C&I) customers in their respective AMI cases.

SCE has incorporated these parameters and assumptions here to design what SCE believes is a balanced and comprehensive program that meets the Commission's objectives and SCE's guiding principles for demand response.

1. Demand Response Programs

a) Peak Time Rebate – Residential Customers

SCE's business case analysis for demand response includes a Peak Time Rebate (PTR) program for residential customers, which is described in detail in Chapter III. PTR provides credits for usage reductions during peak periods (*i.e.,* 2 p.m. to 6 p.m.) on designated critical days. PTR would be an "overlay" to customers' otherwise applicable tariff, whether TOU, or tiered rates, while providing a price signal to encourage load reduction during critical peak periods. SCE's PTR is similar to the program reviewed in SDG&E's AMI proceeding.[3]

The PTR complies with AB1-X, which limits potential demand response from residential customers whose usage does not exceed 130% of their baseline allocation because the law restricts changes to the corresponding Tier 1 and Tier 2 rate levels. Approximately 45% of SCE's residential customers are not exposed to rates above Tier 2.[4] Residential customer usage up to 130% of baseline is protected by the AB1-X rate cap. Under the Commission's interpretation of AB1-X, residential customers cannot be placed on another rate schedule or an overlay such as a dynamic rate schedule that may result in higher bills as their default rate schedule. Thus, AB1-X limits the demand response options for residential customers.

The advantages of PTR include (i) the eligibility of all residential customers for a rebate incentive to reduce usage on critical days; (ii) the coupling of rebates with load control programs to enable pay-for-performance; (iii) the positive reinforcement of a "carrot-only" approach that encourages early acceptance and adoption by millions of ratepayers; and (4) the flexibility such that program features like rebate amounts can be altered without changing customer tariffs.

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[3] D.07-04-043, Opinion Approving Settlement on SDG&E's AMI Project, April 12, 2007.

[4] SCE's analysis of 2005 residential usage showed that approximately 45% of customers never received a bill containing any tier 3 charges.

As detailed in Chapter III and the appendices, the PTR program for the residential class is estimated to provide a peak demand reduction of 410 MW by 2013. This excludes peak demand reductions from load control programs that also rely on PTR as an incentive, which are estimated separately.

b) Load Control Programs – Residential Customers

SCE has one of the largest air conditioning load control programs in the world. Over 220,000 residential customers participate in SCE's current Summer Discount Plan that uses one-way radio frequency switching of on/off devices attached to outdoor compressor units. SCE pays customers incentives in the summer season for customer enrollment in the programs. The program is relatively simple, but offers customers limited flexibility and does not convey directly the customer comfort effect of load control. Providing customers better information about comfort via a thermostat set point and allowing customers some flexibility to override a limited number of events would serve to increase customer enrollments even at lower incentive payments.

Edison SmartConnect™ infrastructure enables communication with PCTs that are designed for load control under the proposed Title 24 building code standard. PCTs are expected to be commercially available in late 2007 and SCE plans to conduct final testing in 2008 consistent with final T24 specifications. With Edison SmartConnect™, SCE can offer two-way communication with PCTs to transfer temperature set point information, event status, and enable customer override. Edison SmartConnect™ meters, through the HAN interface, will be the link between the PCTs and the SCE communication infrastructure.

SCE proposes to enroll customers in an Edison SmartConnect™ Thermostat program in two ways. First, SCE will take advantage of the implementation of the Title 24 building code standard beginning in 2009. According to the proposed standard, all new homes with central air conditioning and heating, ventilation and air conditioning (HVAC) retrofits requiring building permits must have Title 24 compliant PCTs installed. Residential customers equipped with PCTs due to the implementation of this standard will be eligible for the Edison SmartConnect™ Summer Discount Plan. Second, SCE plans to offer rebates to customers to purchase and install T24 compliant PCTs without being subject to building code requirements (*i.e.,* not a new home or retrofit) and enroll in SCE's SmartConnect™ Summer Discount Plan.

The Edison SmartConnect™ Summer Discount Plan would pay an incentive and allow event overrides that would reduce the incentive each time it was exercised, for a limited number of times. Residential customers on this program would also be eligible for PTR rebates. In this way, load control becomes a pay-for-performance approach to demand response.

SCE will continue to operate the existing Summer Discount Plan with one-way A/C compressor switches but the program will be closed to new enrollments beginning in 2009. SCE will have approximately 600 MW of dispatchable peak load on the existing program by the end of 2007. SCE does not include power procurement benefits from this existing program in the Edison SmartConnect™ business case.

In addition to dispatch for reliability, SCE plans to dispatch the Edison SmartConnect™ Summer Discount Plan and the existing Summer Discount Plan for economic reasons.[5] Economic dispatch of load control would be based on a price signal. The dispatch for economic reasons could be up to 15 times per year.

SCE expects that it can reasonably enroll about 25% of residential customers with central air conditioning through a combination of its existing Summer Discount Plan program or a new Edison SmartConnect™ Summer Discount Plan involving Title 24 compliant PCTs. SCE does not seek authority to dispatch the existing Summer Discount Program in this Application. SCE plans to seek such authority as part of its 2009-2011 demand response program application.

c) Summary of Eligibility and Benefits

The following table outlines eligibility in SCE's demand response programs for residential customers.

[5] SCE does not seek authority to dispatch the existing Summer Discount Program in this Application. SCE plans to seek such authority as part of its 2009-2011 demand response program application.

Table II-1
Summary of Residential Customer Eligibility for Edison SmartConnect™ Demand Response Programs

PTR	• Residential customers (except those on CPP)[6]
Edison SmartConnect™ PCT Program	• Residential customers with T24

The following figures summarize the forecast demand response MW reduction by 2013, the first year that Edison SmartConnect™ will be fully deployed.

Table II-2
Edison SmartConnect™ Enabled Demand Response Program Estimated Reductions by 2013 (in MW)

PTR – Residential	410
Edison SmartConnect™ PCT Program	342

Given certain capacity costs and other assumptions outlined in Appendix B, the estimated megawatt (MW) savings for the Edison SmartConnect™ demand response programs provides significant benefits as summarized in Exhibit SCE-3. The appendices hereto provide further information on these demand response programs, including assumptions regarding price elasticity, participation rates, and capacity costs.

2. Dynamic Rates

a) Voluntary Dynamic Rates for Residential Customers

SCE believes that the ultimate solution to sustainable demand response is dynamic time differentiated rates. Due to the AB1-X limitations on dynamic pricing for residential

6 Residential customers on the CPP rate will not be eligible for the PTR program.

customers, SCE will offer CPP and TOU rates to residential customers on a voluntary basis, although the bulk of demand response from this class is expected to come from PTR and load control. In the Statewide Pricing Pilot of dynamic rates in 2003 and 2004, SCE found that it was difficult to recruit customers onto dynamic rates for the program, despite bill protections and incentive payments. Thus, SCE does not anticipate significant enrollment on a purely opt-in basis without substantial marketing and promotion.

b) Voluntary Critical Peak Pricing (CPP) for Residential and C&I Customers under 200 kW

SCE plans to offer business customers under 200 kW a CPP rate on a voluntary (opt-in) basis. CPP will be beneficial for those customers that can reduce their load during system peak days. A CPP rate provides for significant price increase for all usage during peak periods (*i.e.,* 2 p.m. to 6 p.m.) of critical days, offset by reduced prices during non-CPP periods.

SCE will also offer CPP rates to residential customers on a voluntary opt-in basis. However, a residential customer on CPP is not eligible to participate in the PTR program. Based on the similarities in the expected change in customer usage between the two programs, the CPP benefits are embedded in the PTR benefit estimates, which assumes 100% enrollment.

c) Time-Of-Use (TOU) for Residential and C&I Customers under 200 kW

SCE expects to default medium C&I customers (20 to 200 kW) to a TOU rate. The TOU rate will reward demand response on a year-round basis relative to the customers' Otherwise Applicable Tariff (OAT). To preserve customer choice, SCE retains the OAT as an opt-out option. To the extent that a revenue deficiency results from customers opting to their lowest available rate, the deficiency would be recovered from the rate group via a hedging premium added back into the OAT.

Small C&I customers (below 20 kW) will have the option of enrolling in a TOU rate. As stated previously, the Statewide Pricing Pilot did not demonstrate that this customer group is responsive to time-based priced signals. Thus, while small C&I customers (< 20 kW) may provide demand response under a TOU rate, SCE assumes no demand response benefits from the small C&I customers for purposes of the Edison SmartConnect™ business case.

SCE will also offer TOU rates to residential customers on a voluntary (opt-in) basis.

The following table outlines SCE's customer eligibility for Edison SmartConnect™ dynamic rates.

Table II-3
Summary of Eligibility for Edison SmartConnect™ Dynamic Rates

Voluntary CPP	• C&I customers (0 kW to 200kW) • Residential customers
Voluntary TOU	• Small C&I customers (< 20kW) with Edison SmartConnect™ meter • Residential customers with Edison SmartConnect™ meter
Default TOU	• Medium C&I customers (20 kW to 200 kW)

Given certain capacity costs and other assumptions outlined in Appendix B, the estimated demand response MW reduction from Edison SmartConnect™ dynamic rates by 2013 is shown below.

Table II-4
Edison SmartConnect™ Enabled Dynamic Rates
Estimated Reductions by 2013 (in MW)[7]

CPP	78
TOU –	53

The appendices hereto include further information on Edison SmartConnect™ dynamic rates, including assumptions regarding price elasticity, participation rates, and capacity costs.

[7] This table includes MW reductions counted for business case purposes. SCE anticipates that there will be participation and MW reductions for all rate offerings, however, it indicates zero MW reductions where SPP data for megawatt reductions were inconclusive or where it is already counting MW reductions, *i.e.,* for residential customers on CPP rates, those reductions are incorporated in the estimates for PTR MW reductions.

III.

DESCRIPTION OF DEMAND RESPONSE PROGRAMS AND DYNAMIC RATES

The purpose of this Chapter is to describe SCE's plan for dynamic rates and load control programs with Edison SmartConnect™. In this Chapter, SCE provides details of Edison SmartConnect™ demand response programs and dynamic rates, including pricing and reliability, events, customer eligibility, incentives, and bill impacts. Further information, including methodologies and specific program elements are included in the appendices to this Volume.

A. Demand Response Programs

1. Peak Time Rebate (PTR)

SCE's proposed PTR program would apply to all residential customers and is similar in concept to the SDG&E PTR program approved in D.07-04-043. The PTR rebate will be an "overlay" to the customer's OAT, whether TOU or tiered rates, and will provide for credits for usage reductions during peak periods of PTR event days.

a) Program Summary

The proposed PTR program will have the following attributes, which are described in more detail in Appendix A:

- Events. Designed for 15 PTR events per year.
- Peak Period. During an event, PTR rebates will be applied to weekday usage from 2 p.m. to 6 p.m., except holidays.
- Event Notification. Customers would be notified of a PTR event through mass media and other communication channels beginning the day prior to the event's occurrence.
- Rebate. Customers would be paid $0.66 / kWh for each kWh reduction during a PTR event. Total potential customer savings could be more than

$0.66 / kWh, as any net usage reduction would also result in bill savings from their OAT.[8]

- Eligibility. All residential customers with Edison SmartConnect™ will be eligible to earn PTR rebates except those on a CPP rate. No proactive steps would be required by customers to sign up for this program. Customer awareness is discussed in the Appendix B to this volume.
- Customer Specific Reference Level (CSRL). SCE is currently assessing various CSRL calculations to maximize customer understandability and reduce free-ridership. However, for purposes of the Edison SmartConnect™ business case, SCE assumes a CSRL based on an average of the customer's highest usage on three of the previous five eligible non-event days prior to the PTR event.
- AB1-X Compatible. PTR is an overlay to a customer's OAT and is compatible with AB1-X. All residential customers, regardless of usage, will have the opportunity to reduce their bills based on their OAT through this program.

After careful consideration of the impacts to customers, rates, and public policy, SCE plans to offer PTR for residential customers. The following are highlights of the PTR program development considerations.

- PTR provides significant potential customer savings during critical events, thereby encouraging demand response.
- PTR maximizes customer participation, as all residential customers (except those on CPP) will be automatically enrolled in the program.

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[8] This PTR credit of $.66/kWh is used as a reasonable level of credit for the purpose of forecasting the demand response in this application. SCE will re-evaluate this credit in Phase II of its 2009 GRC.

- Customers can only win on this program, as there are no penalties for not reducing usage during an event.
- PTR is compliant with AB1-X and consistent with California's Energy Action Plan.

b) Comparisons to Critical Peak Pricing

As described below, given the current constraints imposed by AB1-X and the limited customer adoption of CPP, PTR provides the best opportunity to encourage residential customers to provide significant demand response.

Effects of AB1-X. As discussed in Rulemaking 02-06-001,[9] the rate restrictions imposed by AB1-X limit the ability to derive substantial demand response benefits from residential customers. Residential customers using less than 130 percent of their baseline allowance cannot be charged TOU or CPP rates unless they voluntarily opt in to a TOU or CPP rate. For SCE, approximately 45% of its residential customers use less than 130% of their baseline allowances.[10] Under the Commission's interpretation of AB1-X, default dynamic pricing schedules are not allowed, drastically reducing the potential demand response from residential customers under either Critical Peak Price or TOU tariffs.

PTR Maximizes Residential Customer Demand Response. Given the timing of the Edison SmartConnect™ program, SCE has evaluated various changes to its dynamic rate design to elicit increased customer participation. Among those alternatives, a peak-time rebate provided a means for residential customers using less than 130% of baseline to contribute to demand response without risk of a bill increase. Thus, PTR supports the program's guiding principle of maximizing customer participation.

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[9] *See* R.02-06-001, Assigned Commission and Administrative Law Judge's Ruling Calling for a Technical Conference to Begin Development of a Reference Design Delaying Filing Date, November 24, 2004.

[10] *See* fn. 3 *supra*.

SCE believes that when the rate limits of AB1-X are lifted or expire, the dynamic rate structure for residential customers should be reevaluated. However, until that time, PTR provides the best means to maximize residential customers' demand response.

SPP Market Momentum Enrollment Estimate. The Statewide Pricing Pilot's (SPP) Momentum Market Intelligence (MMI) model found that on an opt-in basis, only about 20% of customers would opt onto CPP rate. Furthermore, MMI's market research found that the CPP-F pilot rate would yield an opt-in market share of 10% of customers that had thirty percent awareness of their rate options, 17% enrollment with fifty percent awareness, and 34% enrollment with one-hundred percent awareness.

Because this market research indicates that the vast majority of customers do not want to voluntarily opt-in to CPP rates, a PTR program for residential customers is preferred until AB1-X constraints end.

c) Summary of Impacts

Applying the results of the SPP, PTR is estimated to provide approximately 410 MW of demand response by 2013 when Edison SmartConnect™ is fully deployed. See Appendix B for a discussion on assumptions and methodologies.

2. Load Control Programs

a) Edison SmartConnect™ Thermostat Programs

The CEC's Title 24 building code initiative for PCTs has provided SCE an opportunity for Edison SmartConnect™ to enable reliable demand response benefits with a PCT program.

The Edison SmartConnect™ system will enable two-way communications with PCT devices that enable the dispatch of command signals, provide information about event status and allow event override. Such features enhance the appeal of load control and increase customer enrollment in programs. The PCT will be activated and controlled via the Edison SmartConnect™ meter and communications system. The PCTs of customers on the program will provide air conditioner compressor curtailment during peak periods by increasing the thermostat set point. Edison

SmartConnect™ will also provide customers with valuable usage information on SCE's website to analyze energy usage patterns to help evaluate how their appliances affect their electricity costs and make appropriate adjustments. Edison SmartConnect™ also allows future functionality for customers to control their PCT and other compatible appliances through the internet or other remote devices.

The SPP report for 2004 and 2005[11] indicates that significant load reductions will be achieved with enabling technology in the commercial and industrial classes as well. SCE will consider future load control programs for the commercial and industrial classes.

b) SCE Existing Summer Discount Plan

SCE plans to retain its existing Summer Discount Plan, but close it to new enrollments when the Edison SmartConnect™ is implemented. By 2009, SCE expects to have over 300,000 residential customers enrolled in its Summer Discount Plan. Edison SmartConnect™ can enable a new approach to load control with these devices to yield reliable peak shaving. This can provide additional sub-transmission and distribution related capital deferral benefits over the existing air conditioning cycling program.

c) Summary of Eligibility and Benefits

Residential customers become eligible for the Smart Thermostat program when a SmartConnect™ meter is installed and a PCT is present in their residential home. There are two ways customers will obtain PCTs. First, SCE customers may purchase a Title 24 compliant PCT and receive a rebate for the purchase and installation costs up to a total of $125 in their existing homes. Second, the Title 24 building code will require the installation of a PCT during new residential construction or permitted HVAC retrofits that require permits.

The CEC is pursuing Title 24 –Building Code changes requiring PCTs for residential new construction and residential HVAC retrofits. The new code will require that all new homes and HVAC retrofits with central air conditioning have a Title 24 compliant thermostat installed. Beginning in 2009, when the new California Building Code is effective, SCE assumes that 25% of

[11] California's Statewide Pricing Pilot: Commercial & Industrial Analysis Update, Final Report, dated June 28, 2006, prepared by Freeman, Sullivan & Company, and Charles River Associates.

customers with PCTs (residential new construction and a portion of residential retrofit construction) with Edison SmartConnect™ meters will enroll in an Edison SmartConnect™ Thermostat program described above. Title 24 project customers (new construction and retrofit) would not be eligible for a thermostat or installation rebate.

SCE believes that it can reasonably enroll about 25% of residential customers with central air conditioning in a load control program – either on its existing Summer Discount Plan, or a new Edison SmartConnect™ Thermostat program involving Title 24 compliant PCTs. To reach this market penetration of customers not already on the two programs mentioned above, SCE assumes another 250,000 existing customers could be enrolled on an Edison SmartConnect™ Thermostat program. All enrolled residential customers would be eligible to receive an annual incentive and be eligible for PTR rebates, as applicable. Customers would also be allowed to override load control events up to five times per season at a charge at a predetermined charge per override.

B. Dynamic Rates

SCE's approach to dynamic rates is to provide a "natural progression" commensurate with expected customer sophistication based on customer size. A default PTR overlay is the preferred means to provide dynamic price signals to SCE's residential customers with customers having the option of selecting TOU rates.

In keeping with SCE's desire to provide customer choice, more sophisticated options are available for each customer class.[12] GS-2 customers who have historically been exposed to the billing nuances associated with demand charges (those exceeding 20 kW of billing demand) will now be asked to extend this level of sophistication to include default TOU rates.

The figure below summarizes the rate offerings, as they would appear as the Edison SmartConnect™ meter deployments occur. While not the subject of this application, displaying the default CPP requirement for customers greater than 200 kW who are already required to be served on a TOU rate displays the complete spectrum of rate sophistication progression in a tabular format.[13]

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[12] GS-1 customers will have opt-in TOU and CPP rates available to them.

[13] Default CPP for customers greater than 200 kW was ordered in D.06-05-038.

Table III-5
Dynamic Rates by Customer Class

	CPP	TOU
Residential	Opt-in CPP	Opt-in TOU
Small C&I (< 20 kW)	Opt-in CPP	Opt-in TOU
Medium C&I (20 kW to 200 kW)	Opt-in CPP	Default TOU
Large C&I (> 200 kW)	Default CPP[14]	Mandatory TOU

1. Critical Peak Pricing (CPP)

Critical Peak Pricing (CPP) is an event-based pricing program which will be designed for SCE's C&I (< 200 kW) and residential customers. The CPP program will provide for significant charges for usage during peak periods (*e.g.*, 2 p.m. to 6 p.m.) of CPP event days. In addition, the CPP charge will be an "overlay" to TOU or OAT.

a) Program Summary

The CPP program will have the following attributes:

- Events. SCE may call up to 15 CPP events per year.
- Peak Period. During an event, CPP charges will be applied to weekday usage from 2 p.m. to 6 p.m., except holidays.
- Event Notification. Customers would be notified of a CPP event through mass media and other communication channels beginning the day before such an event.

[14] In D.06-05-038, the Commission ordered each utility to "incorporate default critical peak pricing tariffs for all eligible customers 200 kilowatts (kW) and above into their next comprehensive rate design proceeding or other appropriate proceeding if directed by the Commission."

- CPP Charges. Customers will be charged $0.66 / kWh in addition to their TOU or OAT rate. SCE's CPP charges are presented here for illustrative purposes. SCE requests that the final dynamic rate designs be established in Phase II of SCE's 2009 GRC, which is expected to be filed in early 2008.[15]
- Participation. All bundled service small and medium C&I, and residential customers will be able to participate. Agriculture and streetlight customers are excluded from the program. The CPP participation rate for medium C&I customers, as determined by the Momentum Market Intelligence simulator tool was determined to be 25.3%. Residential customers on the CPP rate will not be eligible for the PTR program.

b) Program Selection and Comparisons to Default Critical Peak Pricing

The following list highlights the CPP program development considerations.

- CPP rates and other load control programs enable customer choice by being available to small and medium C&I customers on an opt-in basis;
- CPP preserves the current cost allocation among customer rate groups, as the rate will be charged as an overlay to the customer's TOU or OAT rate.
- CPP complies with the law, and is consistent with California's Energy Action Plan.

For C&I customers with demands greater than 20 kW and less than 200 kW, ("medium C&I") CPP provides a strong, direct price signal and can be used in conjunction with TOU. SCE analyzed CPP on both an opt-in and default basis. Given the following considerations, SCE proposes to provide CPP on an opt-in basis to its medium C&I customers.

- Preserves customer choice. Opt-in CPP preserves customer choice by allowing customers the option of participating in the CPP program.

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[15] In D.05-11-009 the Commission determined that dynamic pricing tariff options for all types of customers should be addressed in each utility's comprehensive rate design proceeding. *See* D.05-11-009, Ordering Paragraphs Nos. 3, 4, and 5.

- Minimize adverse customer reactions. In consideration of customer concerns, the company would prefer to limit the use of "mandatory" programs. Rate changes, particularly those that involve a default tariff in addition to the OAT rate, could result in negative customer reactions. In addition, potential customer backlash will be avoided. As evidenced by the repeal of Puget Sound Energy's TOU rate program, a demand response tariff may result in a customer backlash if the majority of customers do not see value in the rate offerings. Opt-in CPP better preserves informed customer choice, relative to default CPP. Thus, CPP provided on an opt-in basis will minimize adverse customer reactions relative to a default CPP tariff.

Additionally, given the inherent uncertainties associated with a new program, it is difficult to anticipate customer responses. Thus, SCE understands that it is important to adopt a flexible program that can be modified, as necessary, to adhere to the purpose and intent of the program.

c) Summary of Impacts and Benefits

Opt-in CPP for SCE's medium C&I customers is estimated to have a demand response impact of 78 MW by 2013 and resulting nominal benefits of $187 million. Consistent with the SPP results, SCE did not calculate any demand response benefits from C&I customers with demands less than 20 kW ("small C&I") into the business case. SCE believes this is an overly conservative assumption. *See* Appendix B for detailed assumptions and methodologies.

2. Time-Of-Use (TOU)

a) Residential

In addition to PTR, SCE will provide an opt-in TOU program for its residential customers. The TOU program is a non-event based rate which will provide customers an incentive to reduce usage during peak periods throughout the year. Eligible customers may opt in to TOU from their current five tier rate schedule (OAT). TOU rates analyzed as part of this business case comply with

AB1-X requirements.[16] [17] For the purpose of this business case analysis, rates for low usage customers (Tiers 1 and 2) remain unchanged, with usage greater than Tier 2 being subject to TOU rates. For the purposes of this business case, SCE has assumed that low usage customers (Tiers 1 and 2) will remain on OAT, while higher usage customers (Tiers 3, 4, and 5) may opt into TOU.

Program Summary. The TOU program will have the following attributes:

- Peak Period. Peak periods will be from 2 p.m. to 6 p.m. weekdays, except holidays.
- Summer Season. While the current TOU-D summer season is defined as 12:00 a.m. on the first Sunday in June and continue until 12:00 a.m. of the first Sunday in October of each year. SCE plans to request a summer season from June 1 to October 1 for each year.
- Rate Structure. Because of the AB1-X cap restrictions, the TOU rate was designed to be revenue neutral to Tiers 3, 4 and 5 with no bill impacts to Tier 1 and Tier 2 customers.
- AB1-X compliance. In D.06-10-051, the Commission ruled that opt-in TOU or CPP rates do not necessarily need to comply with AB1-X provisions. SCE will explore alternative TOU-D rate designs and file its final proposals in the 2009 GRC proceedings.
- Participation. Based on an analysis of bill impacts, SCE estimated that 5.5% of customers would opt-in to the TOU rate. Tier 1 and 2 customers,

[16] One of the modifications being explored is an iterative rate design which is initially established as revenue neutral to the average Tier 3-5 customer. From an assumed participation rate of customers who would realize a reduced bill from TOU participation, the estimated revenue deficiency would either be rolled back into the TOU rate as a participation credit or into the tiered rate as a hedging premium. This is consistent with some of the more recent rate design direction currently being discussed at the CEC. *See* CEC draft report, California's Next Generation of Load Management Standards, Ahmad Faruqui and Ryan Hledlik, May 2007, CEC-200-2007-007-D.

[17] Note that in Decision D.06-10-051, the Commission effectively ruled that AB1-X rate protection does not exist for those customers who choose to opt-in to non-AB1-X conforming rates. While the residential TOU rates presented here do comply with strict AB1-X provisions, SCE is currently studying alternative residential TOU structures and will make its final proposals in its 2009 GRC rate design proceeding (GRC-Phase II).

representing 45% of SCE's customers,[18] will not receive any benefit from the TOU rate. Thus, similar to PTR, AB1-X constraints limit the potential demand response from the TOU rate.

(1) TOU Complements PTR.

While PTR provides a price signal to customers during certain peak days, TOU provides a price signal for customers throughout the year. Year round price signals are important steps in providing equitable cost recovery from those customers whose natural usage pattern is less costly to serve (*e.g.,* primarily night and week-end energy consumers). TOU also provides a compensation mechanism for customers who are willing and able to engage in a permanent load shift (*e.g.,* resetting of a pool pump to off-peak).

For purposes of this business case analysis, SCE has designed its TOU peak period to be consistent with the proposed PTR peak periods. That is, both programs will have a peak period from 2 p.m. to 6 p.m.[19] Customers enrolled in TOU will only need to remember that peak periods are always from 2 p.m. to 6 p.m., regardless of the specific program.

Narrowing the peak period (2 p.m. to 6 p.m.) to four hours compared to the existing six-hour period creates a larger price differential, which allows for increased demand response. A longer peak period would decrease the on-peak TOU rate and dilute the demand response effects.

Although TOU is intended to provide incentives to change customer behavior, because of the AB1-X legislative constraints, TOU will not provide a price signal to lower usage customers (Tiers 1 and 2). More specifically, those customers with usage of less than 130% of their baseline will not be provided an economic incentive to enroll in TOU rates.

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[18] From an initial estimate of 10%, since approximately 45% of customers never received a bill with tier 3 usage, the final participation rate was reduced to 5.5% (55% times 10%).

[19] Narrowing the peak period represents an initial assumption regarding customer preferences of a consistent, narrow TOU period. SCE expects to have these customer preferences validated by the time of its 2009 GRC Phase II application. The definition of TOU-D structures is expected to be debated vigorously during the Phase II proceedings.

(2) Summary of Impacts and Benefits.

Residential customers enrolled in opt-in TOU are estimated to provide approximately 4 MW of demand response by 2013 and the nominal value of demand response benefits that total $14 million.[20] *See* Appendix B for detailed assumptions and methodologies.

b) Commercial and Industrial

In addition to CPP, SCE will continue to provide Time-Of-Use (TOU) rates for its small and medium C&I customers. The TOU program will provide customers an incentive to reduce usage during peak periods throughout the year. Medium C&I customers (20 kW to 200 kW) will be defaulted to the TOU rate, and will have the choice to opt out into the GS-2 rate, while small C&I customers (< 20 kW) will remain on GS-1 with the option to opt-in to a TOU rate.

Consistent with the SPP results, SCE has not calculated any demand response reductions from its small C&I customers (< 20 kW).

(1) Program Summary.

The medium C&I TOU program will have the following attributes:

- Peak Period. Consistent with current summer TOU peak periods for the standard TOU-8 rate group, peak periods will be from 12 p.m. to 6 p.m. summer weekdays, except holidays.
- Summer Season. The summer season will be consistent with the current TOU rates offered to these rate classes.
- Participation Rate. Participation rates for medium C&I customers is estimated to be 46.5%. This high participation rate is due to the default nature of the program.

[20] To avoid double counting the demand response benefits, customers enrolled in both PTR and TOU have been excluded from these amounts.

(2) TOU Complements CPP

TOU complements CPP by providing a price signal for customers throughout the year. Year round price signals are important steps in bringing about a permanent customer behavioral shift. Furthermore, for medium C&I customers, SCE analyzed CPP on both a default and mandatory basis. Given the following considerations, SCE will provide TOU on a default basis to all medium C&I customers.

- Increased customer knowledge regarding energy efficiency and demand response opportunities. Default TOU ensures that all medium usage customers are exposed to dynamic pricing. Even customers opting back to their OAT will be exposed to the goals of dynamic pricing and energy efficiency. Awareness could potentially set the stage for future dynamic pricing changes and a conservation effect for this rate group.
- Preserves customer choice. Default TOU preserves customer choice by allowing customers the option of reverting back to their OAT.
- Minimize adverse customer reactions. In consideration of customer concerns, the company would prefer to limit the use of "mandatory" programs. Rate changes inevitably lead to some customers reacting adversely to the new rate. In particular, mandatory rate changes, without the option of other rates, result in more inquiries and reactions from the affected customer group. A default TOU rate is estimated to provide significant demand response, yet provide the additional flexibility of enabling customer choice.

Given the benefits of demand response, increased customer awareness, and customer choice, SCE will provide a default TOU rate for all medium C&I customers.

(3) Summary of Impacts and Benefits.

Default TOU for SCE's medium C&I customers is estimated to provide approximately 49 MW of demand response by 2013 and the nominal value of demand response benefits that total $176 million. *See* Appendix A for estimated bill impacts and Appendix B for detailed assumptions and methodologies.

3. Continuing Assessment of Pricing Options

SCE will continue to investigate and assess dynamic pricing options, and SCE may revise its elements of its dynamic pricing structure in the 2009 GRC Phase II proceeding, which is expected to be filed in early 2008.[21]

C. Other Program Attributes

1. Conservation Effect

The SCE Demand Response programs provide customers in both retail and wholesale electricity markets with a choice whereby they can respond to dynamic or time-based prices or other types of incentives by reducing and/or shifting usage, particularly during peak periods. The conservation effect of these demand response programs is the reduction of energy used by specific end-use devices or energy systems, without affecting the services provided; reducing overall electricity consumption, often without explicit consideration for the timing of program-induced savings.

Experience to date indicates clearly that demand response reduces total electricity consumption. In a Meta-study of over 100 demand response programs it was found that electricity customers cut energy consumption.[22]

- Dynamic Pricing programs: average 4% total energy savings
- Customer Feedback programs: average 11% savings
- Reliability programs: ~0.2% (est.)

[21] *See* fn. 13, *supra*.

[22] King and Delurey, Efficiency and Demand Response: Twins, Siblings, or Cousins? Public Utilities Fortnightly, March 2005.

Several aspects of demand response reduce consumers' overall energy usage, the magnitude of which depends not only on the technologies and practices used, but whether they are developed and deployed with efficiency in mind. Education and support to the customer, important in energy-efficiency programs, also are important to demand response programs. One of the most common demand response applications (particularly in commercial buildings and particularly for short periods) is the dimming of lights or switching off of certain fixtures. Lighting- based demand response does not shift load, it eliminates the load without a rebound because post-event, the area will not be "overlit" to compensate for the earlier "under" lighting.

An analysis of two commercial-sector programs in California revealed that less than one-fourth of participants reported compensating for demand response with higher usage either before or after the demand response event (5 percent and 17 percent of all participants respectively). SCE believes that the most significant and positive relationship between demand response and energy conservation is that demand response increases energy awareness and provides feedback for consumers on their usage behavior. There is an extensive body of experience with utility programs that influence behavior by providing feedback and energy information directly to customers.

Given the wide body of studies used to validate the conservation effect, SCE assumed that for each customer class on a Demand Response program, their average annual MW usage would decrease by 1%. SCE assumed that the average MWh per year is the following:

Table III-6
Average Annual MWh by Customer Demand

Customers	Annual MWh
All Below 20kW	7 MWh
C&I >20kW <100kW	100 MWh

It is estimated that the conservation effect of customers on a demand response program will have an impact of 382,332 MWh in 2013 and resulting nominal benefits of $636 million using the estimated avoided energy costs per MWh.

The Edison SmartConnect™ program is designed to provide a range of energy information and enabling rates and programs to customers to encourage peak load reduction and energy conservation. For the purpose of this business case, SCE has quantified the energy conservation effect only based on the related conservation effect from demand response as described above. SCE recognizes the real potential for conservation resulting in better information for customers on their usage, which will be provided through the internet on a next-day basis, as well as available on more frequent intervals (as often as five seconds) directly from the meter. This is also discussed in the Societal Benefits section of Exhibit SCE-3.

2. Capital Deferral

SCE also performed an analysis of the benefits of sub-transmission and distribution related capital deferral for all demand response tariffs and programs.

Upgrade Avoidance. Distribution related capital deferral related to avoidance of upgrades to existing facilities enabled by Edison SmartConnect™ provides a significant cash flow benefit to SCE. SCE assumed that 20 percent of the projected distribution capital growth related to existing infrastructure could be deferred due to the Edison SmartConnect™ projected MW peak load reductions. The remaining 80 percent of sub-transmission and distribution required capital growth related to existing facilities is unavoidable because of necessary upgrades. The deferred capital spending is based on a 10-year average of estimated sub-transmission and distribution capital costs or $412 thousand per MW. The capital deferral is assumed to begin two years from the year the MW are saved.

The capital deferral related to upgrades to existing distribution related facilities results in a net demand response nominal benefit of $222 million. The transmission capital deferred is based on the incremental MW reduction from Demand Response Programs and Dynamic Rates described in this filing. The capital deferral benefits is inclusive of the dispatch of the existing air conditioning cycling program in a new approach that can provide additional sub-transmission and distribution related capital deferral benefits.

Appendix A

Definitions and Program Descriptions

A. Definitions

The following terms and definitions that are used throughout the Volume 4 testimony and appendices.

- Demand Response refers to customer alteration of electricity usage in response to price signals or incentive mechanisms.
- Dynamic Rates or Dynamic Pricing refers to electricity prices that reflect short term changes in the cost of energy. Rate structures such as Critical Peak Pricing and Time-Of-Use are examples of dynamic pricing options (see definitions below). TOU tariffs are also included under the heading of dynamic pricing here, because prices vary to reflect time of day costs. However, they do not generally vary based on current market conditions.[23]
- Time Differentiated Rates (TDR) refer to electricity prices that depend on the time of day the electricity is used. Time of Use and Critical Peak Pricing rates are TDRs that encourage customers to reduce consumption during on-peak periods by reflecting a combination of the wholesale cost of electricity and the system load in higher on-peak prices.
- Time of Use (TOU) is rate in which predetermined electricity prices vary as a function of usage period, typically by time of day, by day of week, and / or by season.[24]
- Critical Peak Pricing (CPP) is a dynamic rate that allows a short-term price increase to a predetermined level (or levels) to reflect short-term energy costs. In a fixed-period CPP, the time and duration of the price increase are predetermined, but the days are not predetermined. In a variable-period CPP, the time, duration and day of the price increase are not predetermined.
- Peak Time Rebate (PTR) is a demand response program that provides for a direct incentive rebate to encourage customers to reduce usage during peak periods of event days.

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[23] *See* Assigned Commissioner Chong's July 25, 2006 Ruling in A.06-03-005, at p.4.

[24] *See id.*

- Default Rate refers to a tariff selection made automatically without the active consideration by customers. When customers are automatically enrolled in a default rate, they may also be given a choice to "opt-out" to other optional tariffs.
- Mandatory Rate refers to a tariff which is provided to customers without other optional rates.

B. Peak Time Rebate (PTR) Design

As discussed in Chapter III, the Peak Time Rebate (PTR) program will be available for residential customers. Details of the PTR program are outlined below.

1. PTR Events

Number of Events. The proposed PTR program is designed for 15 events per year. These events may occur any time of year (*i.e.* PTR events are not limited to the summer season); although SCE expects the large majority of the events to be called during the summer season from June to September.

Peak Period. During a PTR event, the PTR peak period will be from 2 p.m. to 6 p.m. Furthermore, based upon the SCE specific customer SPP load data from CPP-F and control customers, SCE estimated that 50% of the load drop will be shifting to off-peak hours. Even though there is expected to be a shift in usage, an analysis of SCE's system peak load profile demonstrates that the shift will occur without creating a new system peak in the shoulder periods (*i.e.*, the "rebound" effect").

Notification. PTR events will be called on a "Day Ahead" basis. Notification will begin by 3 p.m. the day before an event would be called. Additionally, as described in Volume 2, SCE expects to notify customers of a PTR event through public broadcasts, voice messages, text messages and other appropriate communication channels.[25]

Trigger Mechanism. SCE will use a trigger mechanism to identify event days. PTR event days may be triggered by the occurrence of one or more of the following:

[25] In the longer term, notification of pricing events such as PTR could vary from day ahead to day of depending on system needs as media communications from advanced technologies, such as text messaging, iPhones, *etc.* become more prevalent. In this context, the current Commission definition of "day of" programs being defined as system reliability programs will need refinement.

- CAISO Electrical Emergency Alerts. From a statewide perspective, the CAISO may issue an Electrical Emergency Alert. Upon notification that such an alert has been declared, SCE may notify customers that the following day will be a PTR event day.
- SCE System Emergencies. Events may also be triggered when SCE experiences a system emergency related its grid operations. To the extent that SCE is aware of such an emergency, it may notify customers of a PTR event day.
- SCE System and Weather Conditions – As weather conditions are the primary driver in predicting system peaks, SCE will utilize forecasted temperature to trigger an event day.

More specifically, when the predicted temperature for the next day in downtown Los Angeles reaches 87 degrees or hotter, SCE may call a PTR event day. SCE will utilize the forecasted weather and its system load forecast to determine whether a PTR event day is warranted. If system reserves appear adequate (*e.g.*, a low generation "heat-rate" (BTU / kWh), then SCE may not call an event, even though the temperature trigger threshold has been met. This forecasted temperature trigger provides customers and the media with a simple, reliable method to anticipate PTR events.

As discussed above, the CAISO Electrical Emergency Alert is a statewide event upon which all three large investor-owned utilities will respond as required. SCE may adjust the trigger definitions and thresholds to accommodate efforts to develop a consistent, statewide event trigger.

2. Rebate

During PTR events, customers would earn a rebate of $0.66 / kWh for usage less than their customer specific reference level. The $0.66 / kWh rebate is based on the 2006 GRC long run avoided capacity cost of $75 / kW-year, adjusted for losses, the value of day-ahead call option, and the Loss of Load Probability (LOLP). In developing this rebate, SCE assumed a secondary service loss adjusted capacity cost which was de-rated due to the programs' limited availability (15 event days * 4 hours / event = 60 hours) and uncertainty associated with the day-ahead call. The resulting de-rated capacity value is allocated by LOLP to provide the summer on-peak plus winter mid-peak value.[26] The resulting derated capacity value was then divided into the 60 program hours to determine the PTR rebate of $0.66 / kWh.

3. Eligibility and Response Rate

100% of residential customers with Edison SmartConnect™ meters will be automatically eligible for the PTR program and customers will not be required to take any action to enroll in PTR. The estimated demand response associated with PTR uses the demand elasticities developed in the Statewide Pricing Pilot. SCE believes that a reasonable range for a PTR event awareness rate is 50% to 70%. See Appendix B for a more detailed discussion regarding PTR awareness and demand response rates.

4. Customer Specific Reference Level (CSRL)

Definition. The PTR rebate is based on a customer's usage reduction during peak periods of event days. The usage reduction is calculated by comparing actual usage to an estimate of usage that would have normally occurred during event hours on a critical peak day. This estimate of usage during the critical peak day is known as the customer specific reference level (CSRL). CSRL is compared to actual usage during peak hours of event days to calculate a customer's demand response and their associated rebate.

CSRL Objective. The development of a CSRL definition and methodology has the following objectives.[27]

- Simplicity, including ease of use, ease of understanding, and low costs for participant and operator to calculate the CSRL load profile and resulting savings.
- Accuracy, including lack of bias (*i.e.*, no systematic tendency to over- or under-state reductions), appropriate handling of weather-sensitive accounts, and verifiability.

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[26] Consistent with the methodology described in Appendix A of Rulemaking 07-01-041 Straw Proposals for Load Impact Estimation and Cost Effectiveness Evaluation of Southern California Edison Company, San Diego Gas & Electric Company, and Pacific Gas and Electric Company filed on July 16, 2007 as part of R.07-01-041.

[27] Protocol Development for Demand Response Calculation – Findings and Recommendations, prepared for the California Energy Commission, February 2003, 400-02-017F, by KEMA-XENERGY, Miriam Goldberg and G. Kennedy Agnew.

- Minimization of the ability for customers to game or inflate their CSRL load profile.
- Predictability, or the ability for customers to know their CSRL before committing to a particular curtailment amount and event.
- Minimization of free-ridership.

Thus, the CSRL should accurately represent, to the extent possible, an estimate of each customer's usage during peak periods in the absence of a price incentive. Furthermore, predictability and the ability to know the CSRL in advance of a peak day are other factors to consider in the development of CSRL. Finally, the CSRL should be simple for customers to understand. Customers cannot be expected to respond to a program if they lack understanding of how their rebates are calculated.

Continuing CSRL Evaluation. Similar to the final dynamic rates, SCE will develop a CSRL definition to be evaluated as part of SCE's 2009 GRC Phase II proceeding. For the purposes of this filing, SCE has defined CSRL as the average 2 p.m. to 6 p.m. usage for the highest 3 of 5 previous weekdays (excluding holidays and previous event days).

SCE is currently evaluating several definitions of CSRL that best meet the objectives stated above. The following are some of the potential CSRL definitions that will be evaluated and a proposed definition will be included in SCE's Phase II GRC application.

- Highest 3 of 5 – Similar to SDG&E's customer reference level methodology,[28] under this method CSRL would be defined as the peak period usage during the highest 3 of 5 previous eligible non-event days.
- 5 Previous Eligible Days – Under this method, CSRL would be defined as the average 2 p.m. to 6 p.m. usage during the 5 previous eligible days (weekdays, excluding holidays and previous event days).

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[28] SDG&E Application No. 07-01-047, Exhibit No.: SDGE-13, Prepared Direct Testimony of Leslie Willoughby, dated January 31, 2007, pp. 4 to 10.

- 5 Previous Eligible Days Adjusted For Temperature – Same method as above, but adjusted for weather by analyzing a regression of on-peak usage as a function of temperature.
- Top 12 Days Same Month Previous Year – This method would define CSRL from the prior year's usage, and has the advantage of providing the CSRL prior to the event's occurrence. An alternative method would be necessary for new customers.

The development of an appropriate CSRL requires the balance between a simple, less accurate CSRL versus a complex, but more accurate CSRL. SCE will evaluate the potential CSRLs relative to the objectives stated above with the overarching goal of assisting customers' demand response.

CSRL Accuracy. As stated above, determining an appropriate CSRL to facilitate demand response involves a level of trade-offs. Furthermore, SCE expects to learn and gain new insights into the appropriate design of CSRL as the Edison SmartConnect™ project is implemented. Thus, SCE believes that it would be appropriate to periodically re-evaluate, as necessary, the CSRL methodology in a continuing process of improvement.

5. Customer Eligibility

As mentioned previously, PTR will be available for all bundled service residential customers, including those residential customers that participate in SCE's direct load control programs, including the Summer Discount Plan. Direct incentives for load control programs would be lower than provided today to account for PTR. Customers on a CPP rate are not eligible for PTR.

6. Bill Impacts

PTR is expected to have the following bill impacts, assuming no shift in usage.

Table A-7
PTR Bill Impacts for Non-CARE Customers

% Bill Impact	# of Accounts[29]	% of Accounts	Average OAT Rate (cents / kWh)	Average PTR + OAT Rate (cents / kWh)	% Impact
< 15%	495	0.0%	12.1	9.7	-20.0%
-10 to -15%	4,366	0.1%	12.3	10.8	-12.0%
-5% to -10%	54,972	1.8%	13.6	12.7	-6.3%
-2% to -5%	305,197	9.8%	14.4	14.0	-2.9%
-2% to -0.1%	2,293,428	73.8%	16.3	16.3	-0.5%
0% to -0.1%	447,790	14.4%	17.1	17.1	0.0%
> 0%	-	-	-	-	-
Total	3,106,248	100.0%	16.2	16.1	-0.7%

Table A-8
PTR Bill Impacts for CARE Customers

% Bill Impact	# of Accounts[30]	% of Accounts	Average OAT Rate (cents / kWh)	Average PTR + OAT Rate (cents / kWh)	% Impact
< 15%	2,656	0.3%	9.2	7.5	-18.3%
-10 to -15%	4,520	0.5%	8.8	7.8	-11.9%
-5% to -10%	24,303	2.5%	9.5	8.9	-5.9%
-2% to -5%	125,099	12.6%	10.1	9.8	-3.0%
-2% to -0.1%	735,588	74.3%	10.7	10.7	-0.6%
0% to -0.1%	97,513	9.9%	11.5	11.5	0.0%
> 0%	-	-	-	-	-

7. PTR Rebate Payments

Assuming a 20% load reduction, total annual PTR payments are expected to be approximately $68 million (based on SPP price elasticities, and “3 of 5” CSRL definition). These rebates will be included in the customer’s next bill as a line item credit. Assuming no shift overall residential usage patterns, SCE expects PTR payments to be $27 million as a natural consequence of

[29] Customer counts shown above represent population counts using the original load research sampling weights, un-adjusted for sample attrition.

[30] *See id.*

individual customer usage reductions during the peak periods. In addition, a small number of customers will reduce usage, but not receive a rebate. This will also occur on a random basis due to a customer's activities on days which are taken into consideration in the CSRL calculation. For example, suppose a customer returns from vacation after a heat storm. During the next PTR event, that customer may reduce usage, but not to the point where a rebate is earned since usage is not below their CSRL established while they were on vacation. Due to its random nature it is not possible to eliminate this situation, although it is desirable to minimize its effects. While an initial estimate of credits will be estimated and accounted for in setting the residential rate levels to address any inter-rate group subsidization, subsequent revenue surpluses or deficits resulting from the PTR rate will be accounted for in SCE's annual Energy Resource Recovery Account (ERRA) filing.

C. Edison SmartConnect™ Thermostat Load Control Program

SCE proposes an Edison SmartConnect™ Thermostat program for all residential customers. The proposed Smart Thermostat program will provide for credits for participating in events setback the temperature 4 degrees on customers Title 24 compliant PCTs.

1. Program Summary

The proposed Edison Smart Thermostat Program with a PCT will have the following attributes:

- Enrollment. Customers will sign up into the SmartConnect™ Summer Discount Program and register their PCT with the Edison SmartConnect™ meter.
- Installation. Enrolled customers will be eligible to receive a $125 rebate for PCT equipment and installation costs. New construction or HVAC retrofits will not be eligible for the $125 rebate.
- Events. SCE may call up to 15 economic events and 5 reliability events per year. During an event, the PCT will be raised 4 degrees through the Edison SmartConnect™ meter. SCE estimated that 50% of the load drop will be shifting to off-peak hours.

- Event Notification. Advanced customer notification is not necessary since the thermostat will be controlled by SCE. However, the PCT will have a notification indicator so that customers will know that an event is occurring.
- SmartConnect™ Thermostat Program Participation Credit. All enrolled customers will be eligible to receive an annual incentive credit on their bill.
- Event Override. Participating program customers will be allowed to override up to 5 events per year at a predetermined charge per event.
- Participation. In conformance with anticipated Title 24 mandates, all new residential construction and residential HVAC retrofits will be required to install a PCT. Enrollment is voluntary and SCE assumes that 25% of customers subject to Title 24 will participate in the Edison SmartConnect™ Thermostat program.

2. Summary of Impacts and Benefits

The Edison Smart Thermostat Load Control Program for PCT customers is estimated to have a demand response impact of about 342 MW by 2013 and resulting nominal benefits of $1,127 million See Appendix B for detailed assumptions and methodologies.

D. Critical Peak Pricing (CPP) Rate Design

As detailed below, the CPP rates are event-based and are designed to be consistent with the proposed residential PTR program in terms of events, peak periods, triggers, and notification. CPP will be available to C&I (< 200 kW) and residential customers on an opt-in basis.

1. CPP Events

Under the CPP program, SCE may call a maximum of 15 events per year. These events may occur any time of year (*i.e.*, CPP events are not limited to the summer season); although SCE expects the large majority of the events to be called during the summer season from June to September.

During a CPP event, the CPP peak period will be from 2 p.m. to 6 p.m. Furthermore, based upon the SCE specific customer SPP load data from CPP-F and control customers, SCE estimated that 50% of the load drop will be shifting to off-peak hours. Even though there is expected to be a shift in usage, an analysis of SCE's system peak load profile demonstrates that the shift will occur without creating a new system peak in the shoulder periods (*i.e.*, the "rebound" effect").

Similar to PTR, CPP events will be called on a "Day Ahead" basis. Notification will begin by 3 p.m. the day before an event would be called. SCE expects to use voice messages, text messages and other appropriate communication channels to notify customers of CPP events. Similar to PTR, SCE will utilize a trigger mechanism to identify event days. CPP event days may be triggered by the occurrence of one or more of three pre-defined trigger mechanisms.[31]

2. CPP Rate and Assumptions

CPP Rate. From an economic standpoint, CPP is the "inverse" of PTR. That is, given certain assumptions, an informed customer would be indifferent to a CPP charge or a PTR rebate. Accordingly, the calculation of such charge and rebate would be the same. Thus, during CPP events, customers would be charged a tariff of $0.66 / kWh for usage in addition to their TOU or OAT rate.

CPP Rate Assumptions. Similar to the PTR rebate, the $0.66 / kWh tariff is based on the 2006 GRC long run avoided capacity cost of $75 / kW-year, adjusted for losses, the day-ahead value and Loss of Load Probability (LOLP). See PTR rebate section of this appendix for more information on the assumptions used in the development of the CPP charge. The CPP tariff is presented here for illustrative purposes. SCE requests that the final dynamic rate making be incorporated into SCE's 2009 GRC Phase II proceeding, which is expected to be filed in early 2008.

Revenue Neutrality. The CPP charges are expected to result in an estimated surplus of $115 million per year, which is based on the assumption that the customers will not change behavior during the CPP events. To maintain revenue neutrality, the estimated surplus is then divided by the non-event kWh to provide a rate reduction of $0.01 / kWh for usage during non-event periods. Any revenue surpluses or deficits resulting from the CPP rate will be offset in SCE's annual Energy Resource Recovery Account (ERRA) filing.

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[31] *See* PTR trigger discussion in Section B of this appendix, *supra.*

3. Participation

SCE used the MMI simulation model developed in the SPP to predict initial customer enrollment on tariffs based upon customer awareness and potential bill savings. SCE assumed that those enrollment rates would be sustained over the full study period. Although the model provided a point estimate, the margin for error in this approach is significant. Utilizing this methodology, the opt-in CPP participation rate was estimated to be 25.3% of all medium C&I customers. Additionally, the actual number of respondents will increase in proportion to the meter installations.

4. Customer Eligibility

Small and medium C&I customers equipped with Edison SmartConnect™ meters are eligible to enroll in a CPP rate, including those who also participate in SCE load control programs. Similar to the CPP rate offered to large C&I (> 200 kW), the CPP will be available for Bundled Service Customers only. Furthermore, agriculture customers will not be eligible for CPP. These customers generally use off-peak loads with over 70% of agriculture customer usage already served on a TOU rate. Thus, relative to the much larger contributions from the rest of residential customers, demand response from agriculture customers is expected to be substantially less significant. Similarly, street lighting customers have off-peak loads and are not expected to be able to provide significant demand response. Thus, SCE will not make the CPP program available to street lighting customers. Residential customers on the CPP rate will not be eligible for the PTR program.

5. Bill Impacts

CPP for medium C&I customers (20 kW to 200 kW) is expected to have the following bill impacts, assuming no shift in usage.

Table A-9
Bill Impacts for Medium C&I Customers

% Bill Impact	# of Accounts[32]	% of Accounts	Average OAT Rate (cents / kWh)	Average CPP + OAT Rate (cents / kWh)	% Impact
< 10%	-	-	-	-	-
-5% to -10%	3,333	2.9%	12.0	11.2	-5.9%
-2% to -5%	15,796	13.5%	12.8	12.5	-2.7%
-2% to -0.1%	38,049	32.5%	13.0	12.9	-1.0%
0% to -0.1%	2,515	2.2%	13.2	13.2	0.0%
0% to 2%	35,441	30.3%	13.7	13.8	1.0%
2% to 5%	19,456	16.6%	15.3	15.8	3.0%
5% to 10%	2,252	1.9%	17.9	19.0	6.1%
10% to 15%	82	0.1%	22.9	25.5	11.3%
> 15%	-	-	-	-	-
Total	116,924	100.0%	13.5	13.5	0.0%

SCE's bill impact analysis above shows that for GS-2 C&I customers, approximately 2.0% will experience annual bill increases of more than five percent, while about 2.9% will experience a bill decrease of more than five percent, assuming no load response and fifteen events called. In other words, absent any demand response, bill impacts for 95.1% of GS-2 customers will be limited to within plus or minus five percent. Assuming a ten percent load reduction response, 0.1% of customer will experience annual bill increases of at least nine percent, while 2.9% will experience a bill decrease of at least five percent.

E. Time of Use (TOU) Rate Design

As detailed below, SCE's TOU rates are non-event based and are designed to be consistent with the other dynamic rates and demand response programs, including PTR and CPP.

1. Residential

a) Rates

SCE's illustrative non-CARE[33] residential TOU rates are as follows.[34]

[32] *See* fn. 27, *supra*.

Table A-10
Illustrative Non-CARE Residential
TOU Rates[35]

Summer On-Peak	$0.63
Summer Off-Peak	$0.25
Winter On-Peak	$0.24
Winter Off-Peak	$0.20

For comparative purposes, SCE's OAT residential rates are as follows:

Table A-11
Residential Rates from Schedule D:
Domestic Service[36]

Tier 1	$0.12
Tier 2	$0.14
Tier 3	$0.22
Tier 4	$0.26
Tier 5	$0.29

In deriving the TOU energy rates, SCE first estimated the TOU generation marginal energy and capacity costs revenue from 2 p.m. to 6 p.m. by multiplying the estimated TOU unit marginal cost prices pertaining to energy and analyzed capacity from 2 p.m. to 6 p.m. by the TOU

Continued from the previous page

33 The California Alternate Rates for Energy (CARE) Program offers income-qualified customers a 20% discount off their monthly bills. Enrolled customers are also exempt from the 2001 rate increases ordered by the California Public Utilities Commission.

34 SCE's AB1-X compliant TOU tariff is presented above for illustrative purposes. SCE requests that the final AMI rate making be incorporated into SCE's 2009 GRC Phase II proceeding, which is expected to be filed in early 2008.

35 Illustrative Non-CARE residential TOU rates are designed to be revenue neutral to Tiers 3, 4, and 5 of the residential schedule D rates (OAT).

36 Schedule D rates effective as of 1/1/07.

usage during the same time period. Once the TOU generation marginal cost revenue was estimated, SCE allocated the total generation revenue at usage greater than 130% of baseline on the basis of the TOU generation marginal cost revenue as described. The resulting allocated generation revenue by the TOU period is then divided by the corresponding kWh consumption to derive the TOU energy charge at usage greater than 130% of baseline. Finally, the TOU SCE generation charges at usage greater than 130% of baseline are obtained by subtracting out the DWR power charge

The TOU peak period will be consistent with the proposed PTR peak period which is from 2 p.m. to 6 p.m. In addition, consistent with the SPP, SCE has assumed no change in energy usage for TOU customers. As stated in the Impact Evaluation of the California Statewide Pricing Pilot, Final Report, March 16, 2005, prepared by Charles River Associates, "There was essentially no change in total energy use across the entire year based on average SPP prices. That is, the reduction in energy use during high-price periods was almost exactly offset by increases in energy use during off-peak periods."

b) Enrollment Rate

Based on an analysis of bill impacts, SCE estimated that 5.5% of customers would opt-in to the TOU rate. To determine this percentage, SCE estimated that customers that could reduce their bill by 10% or more would opt-in to TOU. Based on an analysis of bill impacts, before load shifting 10% of all residential customers would be able to save 10% or more by adopting a TOU rate. Furthermore, 55% of all residential customers would potentially benefit from TOU.[37] Thus, an estimated 5.5% of all residential customers are estimated to opt-in to TOU (55% times 10% = 5.5%)

As stated previously, because of AB1-X constraints, 45% of residential customers will not be incented to enroll in TOU rates. For the purpose of this business case, the actual number of enrollees will increase in proportion to the meter installations.

[37] SCE Regulatory Policy and Affairs' analysis of 2005 domestic usage showed that approximately 45% of customers never received a bill containing any Tier 3 charges. Thus, the remaining 55% of residential customers are not protected by AB1-X, and could potentially benefit from a TOU rate.

c) Customer Eligibility

All residential customers are eligible for TOU, including those that are enrolled in the CARE program. Furthermore, residential customers that participate in SCE's direct load control programs will also be eligible to participate in TOU.

d) Bill Impacts

Estimated bill impacts were produced from SCE's load research samples used in rate design not only to insure correct revenue neutral rate designs to class averages, but to assess the degree to which the customers might be impacted by these cost-based rates. Residential TOU is expected to have the following bill impacts, assuming no shift in usage.

Table A-12
TOU Bill Impacts for Non-CARE Residential Customers

% Bill Impact	# of Accounts[38]	% of Accounts	Average OAT Rate (cents / kWh)	Average TOU Rate (cents / kWh)	% Impact
< 15%	16,819	0.5%	23.8	19.8	-16.9%
-10 to -15%	38,632	1.2%	22.5	19.7	-12.6%
-5% to -10%	157,371	5.1%	20.3	18.8	-7.3%
-2% to -5%	238,901	7.7%	17.8	17.2	-3.5%
-2% to -0.1%	527,205	17.0%	15.0	14.9	-0.8%
0% to -0.1%	908,443	29.2%	12.2	12.2	0.0%
0% to 2%	355,917	11.5%	15.7	15.9	1.1%
2% to 5%	363,038	11.7%	16.1	16.6	3.5%
5% to 10%	361,992	11.7%	15.9	17.1	7.1%
10% to 15%	127,325	4.1%	15.7	17.5	11.9%
> 15%	10,605	0.3%	15.8	18.3	15.7%
Total	3,106,248	100.0%	16.2	16.2	0.0%

[38] *See* fn. 27, *supra*.

Table A-13
TOU Bill Impacts for CARE Residential Customers

% Bill Impact	# of Accounts[39]	% of Accounts	Average OAT Rate (cents / kWh)	Average TOU Rate (cents / kWh)	% Impact
< 15%	1,810	0.2%	12.2	10.4	-15.1%
-10 to -15%	24,806	2.5%	12.8	11.2	-12.3%
-5% to -10%	114,213	11.5%	11.8	10.9	-7.1%
-2% to -5%	129,166	13.1%	10.5	10.2	-3.2%
-2% to -0.1%	117,148	11.8%	10.3	10.2	-0.9%
0% to -0.1%	352,505	35.6%	8.6	8.6	0.0%
0% to 2%	75,553	7.6%	10.4	10.5	1.1%
2% to 5%	42,935	4.3%	10.7	11.0	3.6%
5% to 10%	78,220	7.9%	11.4	12.3	7.0%
10% to 15%	36,593	3.7%	11.8	13.3	12.6%
> 15%	16,730	1.7%	11.8	14.0	18.8%
Total	989,679	100.0%	10.7	10.7	0.0%

The results of SCE's non-CARE TOU rate design and residential bill impact analysis above shows that without any load reduction during peak periods, the number of residential customers experiencing at least a ten percent increase is 4%. For these customers, more than 23% of their usage consists of summer on-peak usage above tier 2, compared to approximately 17% for the all residential customers. The number of non-CARE customers experiencing at least a ten percent decrease is 1.7%. Assuming a ten percent load shift response, 7% of customers will experience annual bill decrease of at least eight percent, while 4% will experience a bill increase of at least ten percent.

2. Commercial and Industrial

As detailed below, the C&I TOU program was designed to complement the CPP program and be consistent with the TOU programs offered to other rate classes. In summary, medium C&I (20 kW to 200 kW) customers will be defaulted to the TOU rate, and have the choice to opt back into the GS-2 rate. In addition, small C&I customers (< 20 kW) will remain on GS-1, and will continue to have the option to enroll in a TOU rate.

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39 *See id.*

a) Rates

Consistent with the current TOU rates offered to these rate classes, the summer season will be defined as 12:00 a.m. on the first Sunday in June and continue until 12:00 a.m. of the first Sunday in October of each year. Furthermore, consistent with current summer TOU peak periods for these rate classes (TOU-8, TOU-GS-1 and GS-2-TOU), peak periods will be from 12 p.m. to 6 p.m. weekdays, except holidays.

- On-Peak: Noon to 6:00 p.m. summer weekdays except holidays
- Mid-Peak: 8:00 a.m. to Noon and 6:00 p.m. to 11:00 p.m. summer weekdays except holidays, 8:00 a.m. to 9:00 p.m. winter weekdays except holidays
- Off-Peak: All other hours.

The Time-Of-Use (TOU) energy rates are derived by allocating the total energy generation revenue of the OAT schedule on the basis of the TOU generation revenue of the current Optional TOU schedule. The resulting allocated generation revenue are divided by the corresponding TOU kWh to obtain the TOU charge on a $/kWh basis, then the TOU SCE generation for the charges are obtained by subtracting out the DWR power charge. SCE will update the TOU studies in its Phase II of the 2009-GRC. SCE's illustrative C&I TOU rates are as follows:

Table A-14
Illustrative Medium C&I TOU
Energy Rates

Summer On-Peak	$0.11
Summer Mid-Peak	$0.09
Summer Off-Peak	$0.07
Winter Mid-Peak	$0.09
Winter Off-Peak	$0.07

Additionally, for medium C&I customers, the demand charge associated with facilities is $8.60 / kW, and the summer on-peak demand charge is $18.79 / kW.

Table A-15
Illustrative Small C&I TOU Rates

Summer On-Peak	$0.20
Summer Mid-Peak	$0.17
Summer Off-Peak	$0.13
Winter Mid-Peak	$0.17
Winter Off-Peak	$0.13

The TOU rates were designed to be revenue neutral to the OAT. Furthermore, SCE's TOU rates presented above for illustrative purposes. SCE requests that the final dynamic rate making be incorporated into SCE's 2009 GRC Phase II proceeding, which is expected to be filed in early 2008.

b) Participation Rate

SCE used the MMI simulation model developed in the SPP to predict initial customer enrollment on tariffs based upon customer awareness and potential bill savings. SCE assumed that those enrollment rates would be sustained over the full study period. Although the model provided a point estimate, the margin for error in this approach is significant.

Utilizing this methodology, the default TOU participation rate was estimated to be 51.3 percent for medium C&I customers. Additionally, the actual number of respondents will increase in proportion to the meter installations. See Appendix B for more information.

c) Customer Eligibility

Small and medium C&I customers equipped with Edison SmartConnect™ meters are eligible to participate in the TOU program including those who also participate in the A/C cycling program. Similar to the CPP rate offered to large C&I (> 200 kW), the CPP will be available for Bundled Service Customers only. Furthermore, Agriculture customers will not be eligible for TOU rates described above. These customers generally use off-peak loads and over 70% of the agriculture usage is currently on a TOU rate. Similarly, street lighting customers have off-peak loads and already have their own rate schedules. Thus SCE will not make the TOU program available to street lighting customers.

d) Bill Impacts

Estimated bill impacts were produced from SCE's load research samples used in rate design not only to insure correct revenue neutral rate designs to class averages, but to assess the degree to which the customers might be impacted by these cost-based rates. TOU for medium C&I customers is expected to have the following bill impacts, assuming no shift in usage.

Table A-16
TOU Bill Impacts for GS-2 Customers

% Bill Impact	# of Accounts[40]	% of Accounts	Average OAT Rate (cents / kWh)	Average TOU Rate (cents / kWh)	% Impact
< 10%	-		-	-	
-5% to -10%	2,594	2.2%	12.3	11.5	-6.4%
-2% to -5%	16,739	14.3%	11.8	11.5	-2.7%
-2% to -0.1%	35,431	30.3%	12.8	12.7	-1.0%
0% to -0.1%	2,489	2.1%	13.2	13.3	0.0%
0% to 2%	39,279	33.6%	14.2	14.4	1.1%
2% to 5%	20,299	17.4%	15.7	16.1	2.9%
5% to 10%	93	0.1%	17.9	18.9	5.8%
> 10%	-		-	-	
Total	116,924	100.0%	13.5	13.5	0.0%

The results of SCE's TOU rate design and GS-2 bill impact analysis above shows that without any load shift during peak periods, the number of medium C&I customers experiencing at least a five percent annual bill increase is 0.1%. Similarly, only 2.2% of customers will receive a bill decrease of more than five percent. Assuming a ten percent load reduction shift response, 17% of customer will experience annual bill decrease of at least three percent, while 0.1% will experience a bill increase of at least four percent.

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40 *See* fn. 27, *supra*.

e) Commodity Revenues

The illustrative TOU and CPP structures shown in this volume have been designed to be revenue-neutral assuming no customer demand response. In general, energy revenue shortfalls resulting from demand response would be contained within SCE's generation rate component. As such, Direct Access (DA) and future Community Choice Aggregation (CCA) customers would be exempt from cost recovery of ERRA revenue shortfalls caused by the demand response rates. Revenue over- or under-collections associated with the PTR rebates, TOU, or CPP rate design, would flow through SCE's ERRA balancing account in the same way as other revenues from the generation portion of the standard tariffs.

F. Measurement and Reporting

SCE will perform certain measurement and reporting activities as a result of its demand response programs. The following activities will assist SCE in quantifying the demand response impacts, refining forecasts of future demand response, and analyzing the effects of any potential program modifications.

Tracking and reporting of monthly demand response. SCE will analyze interval load data and, if requested, will provide reports to the Commission in order to assist in quantifying the demand response benefits and to refining estimates of future demand response. These reports may be provided for all CPP and PTR events, including number of customers that participate, estimated demand response achieved on event days, and comparison of actual & forecasted demand response.

Tracking and reporting of annual demand response. SCE will analyze annual interval load data and, if requested, will provide demand response information, including a summary of demand response, participation rates, the distribution of demand response within each major rate class, and a comparison of actual & forecasted demand response. To the extent possible, SCE may also provide an assessment of customer segment impacts, end-uses, and technological impacts. SCE expects that the annual demand response evaluation reports will evolve as these programs develop.

Performing an annual evaluation of Customer Specific Reference Level. As discussed in Chapter III, the customer specific reference level will be analyzed to evaluate effectiveness in terms of providing relevant information that can be acted upon, providing timely information, reducing "gaming", and reducing the potential revenue deficit / surplus.

Performing customer satisfaction and post event surveys. Periodically SCE may perform customer satisfaction and post-event surveys. These surveys may gauge customer response and acceptance of the various demand response programs. Potential survey topics may include an assessment of the understanding of rates, "fairness" of rates, satisfaction with rates, specific actions taken in repose to rates, source from where the customer was informed of an event day,

Furthermore, SCE may also survey customers to gauge the response to potential future programs. Such topics may include participant interest in other forms of dynamic rates, and interest in enabling technology, such as PCTs.

Appendix B

Program Impacts and Critical Assumptions

The purpose of this Appendix is to provide and overview of the estimated MW and avoided cost impacts from SCE's anticipated demand response programs that are enabled by Edison SmartConnect™. This Appendix also discusses the significant assumptions used in the demand response calculation, such as participation rates, price elasticity, and avoided capacity costs. For the purposes of this Appendix, PTR is included in the dynamic rate discussion as the calculation of impacts is similar to the dynamic pricing impacts calculations.

A. Dynamic Rate and PTR Impacts (MW)

1. Overview

This section presents the MW demand response results from residential and C&I customers. This section is divided into an overview, residential impacts, and C&I impacts, and includes a discussion on participation rates, price elasticities, average use, and other assumptions.

a) Key Drivers

Similar to SDG&E's AMI application and as outlined in the ALJ's decision on the SDG&E AMI settlement Agreement 39, the key drivers of SCE's demand response benefits are:

- Average energy use per customer by time period before being exposed to a new tariff
- Price responsiveness (as summarized by price elasticities)
- The number of customers who choose a tariff or are exposed to the price signal
- The difference between the new price and the old price by rate period
- The value of avoided capacity costs

b) Methodology

In summary, to calculate demand response for each of its programs, SCE:

- Developed revenue neutral rates (based on marginal cost) for each program;
- Used these rates to develop customer bill impacts;

- Developed participation rates based on the bill impacts;
- Applied Statewide Pricing Pilot[41] (SPP) demand elasticity, adjusted for differences in climate and central air conditioning saturation, to calculate average customer impacts;
- Used per customer impacts and participation rates to calculate demand response in MW; and
- Used generation avoided capacity costs to calculate demand response benefits in terms of avoided costs.

c) Demand Response Calculation

Demand response was calculated separately for the following items:

- Residential – PTR
- Residential – Opt-in TOU
- Small Commercial and Industrial – Opt-in CPP
- Small Commercial and Industrial – Opt-in TOU
- Medium Commercial and Industrial – Default TOU
- Medium Commercial and Industrial – Opt-in CPP

Additionally, SCE took into consideration those customers with central air conditioning (CAC) and customers enrolled in the CARE program. Rather than utilizing customer averages, SCE segregated the residential class to more precisely calculate demand response. Customers were bifurcated into those with CAC and those without CAC. These customers were further segregated into those on the CARE program, and those not on the CARE program. These four groupings (CAC and CARE, CAC and non-CARE, non-CAC and CARE, and non-CAC and non-CARE) were used to calculate average per customer impacts and demand response as described previously.

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[41] The Statewide Pricing Pilot (SPP) was a pricing research project designed to estimate the average impact of time-varying rates on energy use by rate period for residential and small commercial and industrial customers. The SPP was authorized in D.03-03-036.

d) Summary Results

In summary, the demand response impacts from the dynamic rates are 132 MW and the impacts from PTR are 410 MW by 2013. Approximately 76% of these demand response benefits are provided by residential customers. The remaining benefits are the result of actions from the medium C&I customers. The following table summarizes the demand response benefits during the deployment period (2000-2012) and the first full year after deployment (2013).

Table B-17
Dynamic Pricing and PTR Demand Response (MW)

Year	Dynamic Pricing Benefits (MW)[42]	PTR Benefits (MW)	Total Demand Response (MW)
2009	12	0	12
2010	54	167	221
2011	93	296	389
2012	122	389	511
2013	131	410	541

2. Residential Dynamic Rate and PTR Impacts

a) Demand Response Summary

As a result of the dynamic pricing programs, demand response from residential customers is estimated to be 414 MW by 2013. Of this amount, PTR accounts for the majority of the demand response with 410 MW, while TOU accounts for 4 MW.

b) Average Use Under Existing Tariff

SCE estimated the existing average energy use by climate zone and rate period for residential and GS-1 customers from SCE's 2005 load research data. SCE's average energy use assumptions are shown in the figure below. On-Peak refers to 2 p.m. to 6 p.m. and Off-Peak refers to all other hours.

[42] Includes benefits from the following dynamic rates: residential TOU, medium C&I CPP and medium C&I TOU.

Table B-18
Existing Average Energy Use (kWh) by Class and SCE Climate Zone

		CPP Day		Non-CPP Day	
	Climate Zone[43]	On-Peak	Off-Peak	On-Peak	Off-Peak
Non-CARE / CAC	2	2.17871	1.23814	1.21938	0.85547
	3	3.20308	1.63688	1.77623	1.02054
	4	3.43190	2.06692	2.21325	1.32445
Non-CARE / No-CAC	2	0.59741	0.56629	0.54685	0.53113
	3	0.84031	0.66438	0.68154	0.56633
	4	0.93666	0.72857	0.81981	0.60732
CARE / CAC	2	1.73977	1.15415	1.08852	0.85346
	3	2.50987	1.30739	1.41810	0.84968
	4	2.72887	1.50089	1.65571	0.91665
CARE / No-CAC	2	0.51655	0.48257	0.46546	0.44362
	3	0.84471	0.73499	0.69884	0.60453
	4	1.33513	1.06742	1.14050	0.84976

c) Participation Rates

For the purposes of this discussion, the following definitions are provided.

- "Participation Rate" is a generic term that refers to the ratio of customers who choose a tariff or are exposed to a price signal. Thus, by definition, "Participation Rate" includes both "Enrollment Rate" and "Awareness Rate."
- "Enrollment Rate" is defined as the percentage of customers who sign up for or are defaulted to a given program.

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[43] Climate Zone 2 (Mild) = Baseline zones 10 (Coastal Area) and 16 (Mountains (elevations above 3,000 feet)). Climate Zone 3 (Moderate) = Baseline zones 13 (Southern San Joaquin Valley) and 17 (Los Angeles Inland area). Climate Zone 4 (Hot) = Baseline zones 14 (Southern California High Desert) and 15 (Southern California Low Desert). A map of SCE's baseline zones can be found at SCE's tariff book.

- "Awareness Rate" is defined as the percentage of customers who become knowledgeable about a rate change (such as a PTR event) prior to its occurrence.

Since all residential customers are eligible for PTR participation, the use of an awareness rate is appropriate for PTR. For other TOU rates, such as the opt-in TOU described later in this testimony, distinctions between enrollment rate and awareness rate have been assumed to be negligible, as TOU is a year round program and customers have become aware of the peak and off-peak periods upon opting into the tariff. For CPP rates, both enrollment rates and awareness rates are determining factors for demand response. Since SCE is relying on the SPP results to estimate demand responsiveness, it assumes the same customer awareness of CPP events as was experienced in the pilot.

(1) Peak Time Rebate (PTR) Program

Enrollment Rate - As described in Chapter III, all customers with Edison SmartConnect™ meters will be automatically enrolled in the PTR program. Thus, the enrollment rate will increase during the deployment period as SmartConnect™ metes are installed and will reach 100% at the end of the deployment period in 2012.

Awareness Rate - In its AMI application, SDG&E assumed a 70% awareness rate. In response to SDG&E's application, the ALJ, DRA, and UCAN all noted that a PTR is not a CPP, and consumers may behave differently to those programs. Subsequently, as described in SDG&E's AMI decision, the DRA recommended a 50% awareness rate which was confirmed by the ALJ in her proposed decision.

As there have not been any significant studies performed on awareness rates, awareness rates are an estimate largely based on professional judgment. Furthermore, on the whole, there do not seem to be any significant factors that would differentiate the awareness rates between SDG&E and SCE (*e.g.*, both programs are based on similar principles, have similar program attributes, and will have a comprehensive notification program).

Utilizing the SDG&E and DRA arguments in SDG&E's application, an awareness rate of 50% to 70% appears to be reasonable. Given the attributes of its specific program, SDG&E believed that 70% was an appropriate estimate of the awareness rate of its customers. More specifically, individualized information (*e.g.*, email, text messages, their website, and word-of-mouth), combined with mass media outlets (*e.g.*, radio, news broadcast, radios ads, *etc.*) would produce a 70% awareness rate amongst its customers.

(2) SCE's PTR Adjustment

SCE also understands that arguments can be made for other awareness rates. Although a 70% awareness rate is reasonable, a 50% awareness rate is conservative. SCE uses a conservative estimate for awareness rates to compensate for the assumption that price elasticities for a rebate and a rate change are the same, as was proposed in the SDG&E application and adopted by the ALJ in the proposed decision. SCE believes that the elasticities for a rebate could be lower than for a rate but there is no empirical evidence on this to date. The following table demonstrates the impacts of the awareness rate on overall demand response by 2013.

- Scenario A: PTR DR with 70% awareness = 574 MW
- Scenario B: PTR DR with 60% awareness = 493 MW
- Scenario C: PTR DR with 50% awareness = 410 MW

(3) Time-Of-Use

Time-of-Use (TOU) rates will be offered on an opt-in basis. TOU peak and off-peak periods will be available all year, as opposed to PTR programs which will be called only during 2 p.m. to 6 p.m. during certain event days. Thus, customers that have taken action to enroll in the program have been assumed to be aware of and respond to the peak and off-peak price signals.

Based on an analysis of bill impacts, SCE estimated that 5.5% of customers would opt-in to the TOU rate. To estimate the participation rate, SCE first estimated that customers that would have a bill reduction of 5% without a change in usage. Based on bill impacts, approximately 10% of all residential customers would be able to save 10% or more by adopting a TOU rate. Furthermore, 54.8% of all residential customers are eligible for TOU. Thus, an estimated 5.5% of all residential customers are estimated to opt-in to TOU (54.8% times 10% = 5.5%).

d) Price Elasticity

(1) SPP Elasticity

Charles Rivers Associates (CRA) used econometric models to derive price elasticities from data collected in the SPP. Two summary measures of price response used in this analysis are the elasticity of substitution between peak and off-peak consumption (which measures changes in customer load shapes, holding daily consumption constant) and the price elasticity of daily electricity consumption (which measure changes in daily consumption, holding the load shape constant). As described above, the elasticities used in the analysis are largely based on the SPP analysis. The SPP statewide elasticities are found in Table 5 of the CRA March 16, 2005 report and are summarized in the figure below for SCE climate zones.

The SPP econometric demand models were based on a CPP-F rate. From an economic standpoint, the average customer would be indifferent to either a rate structure containing a PTR rebate or a CPP charge since one would expect the customer to respond to the opportunity cost of peak consumption. In either case, the rates would be designed to be revenue neutral and any surplus or deficiency would receive balancing account treatment. Thus, assuming that the marginal prices between the programs are the same (*i.e.,* PTR with $0.66 rebate and CPP with $0.66 charge), customers would have similar response in either of the two programs. Thus, SCE has utilized the SPP's CPP-F price elasticities in estimating its PTR demand response. This assumption is similar to what was recommended by the ALJ in her proposed decision in the SDG&E AMI Application.[44]

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[44] *See* fn. 4, *supra*.

Table B-19
Residential CPP-F Rate Elasticity Estimates Statewide, All Summer Averages

Climate Zone	Elasticity of Substitution		Daily Price Elasticity		
	CPP Days	Non-CPP Days	CPP Days	Non-CPP Days	Weekend Days
2	-.061	-.055	-.042	-.044	-.018
3	-.102	-.093	-.043	-.047	-.026
4	-.113	-.105	-.032	-.039	-.020

Statewide SPP elasticity can be adjusted to account for SCE's customer base as described in the following section.

(2) Adjustments to SPP Price Elasticities

To determine price elasticities for SCE, adjustments were made based on the weather conditions (see figure below) and the central air conditioning (CAC) saturations representative of SCE populations in Climate Zones 2, 3, and 4 (see figure below). In addition, certain other adjustments were made to the econometric models to reflect the characteristics of SCE's specific dynamic pricing program and SCE's customers.

Climate - The population weighted average weather for 2000 (determined to be a normal year) in SCE's service territory was used.

Table B-20
Cooling Degree Hours by Zone and Period for Normal Year

Climate Zone	CPP Day		Non-CPP Day		Average Summer Day	
	Peak	Off Peak	Peak	Off Peak	Peak	Off Peak
2	10.39	1.90	1.83	0.17	2.60	0.31
3	21.60	5.59	8.13	1.24	9.45	1.63
4	27.16	12.44	15.95	5.88	17.02	6.47

CAC Saturation - SCE made adjustments for central air conditioning (CAC) saturations within its customer base. In order to obtain more accurate per customer impact estimates, SCE calculated the impacts separately for its CAC and Non-CAC customers rather than relying on average CAC saturations.

Table B-21
SCE Central Air Conditioning Saturations

Climate Zone	CAC Saturation (Percent)
2	21.2%
3	57.8%
4	60.9%
All	41.9%

With the guidance from the SPP consultants, Charles River Associates, and the Pricing Impact Simulation Model (PRISM) tool, SCE derived load reductions for customers in its service territory by making adjustments for central air conditioning saturation and cooling degree hours. SCE utilized the on-peak, non-CPP Day impact estimates as a proxy for TOU and the on-peak CPP Day impact estimate for PTR.

<u>CARE</u> - In addition to CAC saturation, the Residential population was further segmented into CARE and non-CARE customers due to substantial differences in CARE and Non-CARE rates. This results in four groups. Non-CARE w/ CAC, Non-CARE w/out CAC, CARE w/CAC and CARE w/out CAC.

<u>Outer and Inner Summer Elasticity</u> - The SPP calculated elasticities for three summer periods, "inner summer," "outer summer," and "all summer." "Inner summer" included July through September, "outer summer" included May, June and October and "all summer" included May through October. SPP consultants directed SCE to use the "inner summer" elasticity model because it most closely matches SCE's current definition of summer, June through September.

<u>Peak Period</u> - The on-peak period was changed from 2 p.m. – 7 p.m. used in the SPP to 2 p.m. – 6 p.m. A ratio adjustment was used, where the ratio was calculated from hourly elasticities available in the Hourly Residential SPP Report. In particular, the Statewide Pricing Pilot Hourly Complex Model impacts were used to adjust the PRISM

impacts to the shorter on-peak period. PRISM created an average impact for the entire on-peak period. The SPP Hourly Complex Model provided a separate impact for each hour of the 2 p.m. – 7 p.m. on-peak period. SCE utilized the hourly to average ratio from the Hourly Complex Model to adjust the PRISM impacts in order to capture this hourly variation and appropriately adjust the PRISM impacts for the shorter on-peak period.

Table B-22
Actual PRISM Impacts

Non-CARE Customers with CAC					**Non-CARE Customers without CAC**			
Climate Zone	Impact Measure	PTR Rate	TOU Rate		Climate Zone	Impact Measure	PTR Rate	TOU Rate
2	Change (kWh/hr)	-0.400	-0.071		2	Change (kWh/hr)	-0.048	-0.011
	% Change	-18.34%	-2.97%			% Change	-7.96%	-1.13%
3	Change (kWh/hr)	-0.617	-0.102		3	Change (kWh/hr)	-0.078	-0.020
	% Change	-19.28%	-2.80%			% Change	-9.32%	-1.10%
4	Change (kWh/hr)	-0.654	-0.118		4	Change (kWh/hr)	-0.080	-0.026
	% Change	-19.06%	-2.91%			% Change	-8.53%	-1.13%

Load Forecast Adjustment to SPP Load Impacts - The per customer impacts used to estimate demand response MW were adjusted to account for modeling variation using a Monte Carlo simulation. The Monte Carlo Analysis allowed SCE to determine what load impact result from the SPP for SCE customers can be reasonably relied upon in the same way that it can rely on a combustion turbine (CT) operating.

The approximate forced outage rate of a CT is about five percent. As shown in the figure below, to treat the load response consistently, SCE used the lower end of the one-sided ninety-five percent confidence interval peak kW reduction. This is the value that will be available with ninety-five percent certainty when called upon, taking into account statistical modeling variability. The final PRISM and Monte Carlo adjusted per customer kW impacts for the Non-CARE PTR rate are shown in the figure below.

Table B-23
Monte Carlo Adjusted Impacts

Non-CARE Customers with CAC					Non-CARE Customers without CAC			
Climate Zone	Impact Measure	PTR Rate	TOU Rate		Climate Zone	Impact Measure	PTR Rate	TOU Rate
2	Change (kWh/hr)	-0.378	-0.066		2	Change (kWh/hr)	-0.042	-0.009
	% Change	-17.31%	-2.75%			% Change	-7.03%	-0.92%
3	Change (kWh/hr)	-0.583	-0.096		3	Change (kWh/hr)	-0.068	-0.017
	% Change	-18.20%	-2.64%			% Change	-8.06%	-0.94%
4	Change (kWh/hr)	-0.611	-0.112		4	Change (kWh/hr)	-0.066	-0.023
	% Change	-17.81%	-2.76%			% Change	-7.02%	-01.00%

e) Other Assumptions

Timing of Rates - SCE has assumed that PTR will be available in Fall 2009 and the number of program participates will ramp up during the meter installation phase which will occur from 2009 to 2012. Furthermore, SCE assumed that TOU rates will be available as the meters are installed and will ramp up from 2009 to 2012.

Elimination of Double Counting with Load Control Programs - Customers may participate in both PTR and SCE's load control programs. Thus, a potential double counting of demand response benefits may occur. To avoid double counting demand response and to develop a conservative estimate, load control customers have been removed from the population by subtracting those customers from the total residential population.

Furthermore, since the Summer Discount Plan currently exists, the demand response associated with that program should be "credited" to that program, and should not be included as demand response related to the Edison SmartConnect™ program. Thus, to remove A/C Cycling customers from the population of possible participants, the total number of Summer Discount Plan was subtracted from the residential segments with CAC.

3. Commercial and Industrial

Demand response from medium C&I customers is expected to be 140 MW by 2013. Of this amount, 49 MW is expected from TOU and 78 MW from CPP. Additionally, SPP pilot found that small C&I customers have no response to a CPP rate without enabling technology. Thus, SCE is not including demand response benefits from small C&I customers.

a) Average Use Under Existing Tariff

SCE estimated the existing average energy use by rate period for GS-2 and GS-1 customers from SCE's 2005 load research data (2005 is considered a normal weather year). SCE's average hourly kWh energy use assumptions by period are shown below.

Table B-24
Existing Average Energy Use -Medium C&I

	Non-CPP Day kWh/hour			
	On-Peak	Mid-Peak	Off-Peak	CPP
GS-2 / 20-100 kW	19.62	15.07	9.02	24.42
GS-2 / 100-200 kW	81.21	64.63	41.40	100.65

	CPP Day			
	On-Peak	Mid-Peak	Off-Peak	CPP
GS-2 / 20-100 kW	22.25	17.14	10.00	27.64
GS-2 / 100-200 kW	89.54	71.67	45.60	110.78

Table B-25
Existing Average Energy Use – Small C&I

	On-Peak	Mid-Peak	Off-Peak	CPP
Non-CPP Day	2.34	1.62	0.93	2.92
CPP Day	2.00	1.40	0.85	2.50

b) Participation Rates

TOU - TOU will be provided on a default basis to medium C&I customers. The medium C&I participation rates were determined by the Momentum Market

Intelligence (MMI) simulation model which were consistent with the results from the SPP. The MMI model estimated that 46.5% of medium C&I customers would remain on the default TOU rate.

CPP - CPP will be provided to medium C&I customers as an optional program. The participation rates were also determined by the Momentum Market Intelligence model and estimated to be 25.3%.

c) Price Elasticity

(1) CPP and TOU Elasticity

SPP Elasticity - Similar to residential price elasticities, the econometric models utilized for C&I customers were developed by CRA derived from statewide observations in the SPP. Furthermore, the SPP econometric models were based on the CPP-F rate. The following table shows the SPP estimates of the elasticity of substitution for participants.[45]

Table B-26
SPP Estimates of the Elasticity of Substitution for Participants

	Elasticity of Substitution – CPP Days	t-statistic	Elasticity of Substitution – Non-CPP Days	t-statistic
Small C&I	-0.0050	-.045	0.0255	1.23
Medium C&I	-0.0412	-4.79	-0.0493	-3.10

(2) SCE Adjustments to SPP Price Elasticities

Similar to the SPP price elasticity adjustments made for PTR, SCE utilized SPP demand models and made the following adjustments.

Load Forecast Adjustment to SPP Load Impacts - Similar to the adjustment made for residential loads, SCE adjusted the load forecast to SPP load impacts for commercial loads. The per customer impacts used to estimate demand response MW were adjusted to account for modeling variation using a Monte Carlo simulation. The Monte Carlo

[45] *See* fn. 9, *supra*.

analysis allowed SCE to determine what load impact result from the SPP for SCE customers can be reasonably relied upon in the same way that a combustion turbine (CT) can be relied upon. The C&I PRISM impacts and Monte Carlo adjusted impacts are below.

Table B-27
PRISM and Monte Carlo Adjusted Impacts

	CPP	CPP % Impact	TOU	TOU % Impact
Actual PRISM Impacts	-7.43	6.7%	-3.06	3.4%
Monte Carlo Adjusted Impacts	-5.72	5.2%	-2.34	3.3%

PRISM Model - In addition, because enabling technologies are not currently offered as part of the Commercial and Industrial dynamic rates, the non-technology PRISM model was used. The non-technology model has lower elasticities than either the blended model or the technology model. SCE believes this approach is conservative and justified.

B. Load Control Impacts (MW)

SCE's SmartConnect™ infrastructure enables communication with PCTs that are designed for load control under the proposed Title 24 building code. SCE proposes to enroll customers in an Edison SmartConnect™ Thermostat program in two ways. First SCE will take advantage of the implementation of the Title 24 building code standard beginning in 2009.

1. Summary Results

In summary, the demand response impacts by 2013 from the Edison SmartConnect™ PCT load control programs are 342 MW. These impacts are incremental to SCE's estimated benefits from the existing Summer Discount Plan of 1,559 MW in 2013. All of the demand response benefits from load control programs are provided by residential customers. The business case as filed does not consider benefits as a result of actions from the medium C&I customers. The following table summarizes the benefits during the deployment period (2009 to 2012) and for the first full year after deployment (2013).

Table B-28
Load Control Demand Response (MW)

Year	Title 24 Smart Thermostat Program (MW)	Non-Construction Title 24 Smart Thermostat Program (MW)	Total Demand Response (MW)
2009	13	9	22
2010	37	38	75
2011	62	89	151
2012	89	155	244
2013	117	225	342

2. Participation Rates

For the purposes of this discussion, the following definitions are provided.

- "Participation Rate" is a generic term that refers to the ratio of customers who choose a tariff or are exposed to a price signal. Thus, by definition, "Participation Rate" includes both "Enrollment Rate" and "Awareness Rate."
- "Enrollment Rate" is defined as the percentage of customers who sign up for or are defaulted to a given program.

3. Construction Building Code Compliance

According to the proposed Title 24 building code, Residential New Construction customers, SCE assumes that 84% of potential new construction will contain a central air conditioning unit.[46] In order to pass building inspection, the builder will need to install a Title 24 compliant PCT. The annual enrollment rate into the Smart Thermostat program for New Construction customers with an Edison SmartConnect™ meter is assumed to be 25%.

For Title 24 Residential Retrofit customers, SCE assumes that 85,000 residential single and multi-family homes have an HVAC replacement or retrofit per year.[47] Furthermore, the percentage of residential customers who obtain a permit to replace their central HVAC system and therefore install a Title 24 compliant PCT is assumed to be 50%. The annual

[46] Residential Appliance Saturation Survey.

[47] Duct-System Replacement Final Report, March 31, 2004.

enrollment rate into the Smart Thermostat program for Title 24 Residential Retrofit customers with an Edison SmartConnect™ meter is assumed to be 25%.

4. Non-Construction Customer Enrollment

For all other residential customers, SCE would offer rebates to those who purchase and install a Title 24 compliant PCT without being subject to building code requirements (*i.e.*, not a new home or HVAC retrofit) and who enroll in SCE's Smart Thermostat Program. These customers will receive a rebate toward the purchase and installation of a Title 24 compliant PCT. Based on SCE's experience with the current Summer Discount Plan, SCE is targeting an annual enrollment of 60,000 non-construction customers with an Edison SmartConnect™ meter into the Smart Thermostat Program from 2009 to 2032. To be conservative, SCE has capped the cumulative enrollment at 250,000 customers.

5. MW Calculation

The MW are calculated based on the kW reduction per customer and number of air conditioning units for a residential customer. Based on SCE experience with the Summer Discount Plan, SCE assumes that 1 kW[48] is reduced during a SCE Smart Thermostat event during the 4 hours the PCT is set back 4 degrees. Furthermore, SCE assumes residential customers on the existing Summer Discount Plan have 1.2 central air conditioning units per household. To calculate the MW avoided from customers on the Edison Smart Thermostat program, SCE used the mid year customer cumulative enrollments multiplied by 1.2[49] central air conditioners and 1 kW.[50] The result in then grossed up for the summer line loss for capacity of 1.084.[51]

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[48] SCE Experience in 50% cycling Long Island Power Authority based on similar and the Summer Discount Plan Capsule Report dated May 14, 2007.

[49] TP&S experience and research for number of A/C's per customer on Summer Discount Plan

[50] TP&S Experience in 50% cycling Long Island Power Authority based on similar and the Summer Discount Plan Capsule Report dated May 14, 2007.

[51] Market Strategy & Resource Planning - Summer Peak Line Loss.

C. Combustion Turbine Proxy

This section describes SCE's approach in evaluating the economic generation benefits of demand response benefits induced by SCE's dynamic pricing and demand response programs.

This methodology was used in combination with the Commission-assigned estimates of avoided capacity and energy values to analyze the economic benefits of demand reductions. SCE believes the end result is a more accurate and mathematically-sound assessment of the economic value of demand reductions caused by dynamic pricing and demand response programs.

1. Summary of Benefit Calculation Methodology

SCE's approach uses avoided cost principles (marginal energy and capacity) as the value proxy for generation benefits and also incorporates "value adjustments" (both positive and negative) to account for reserve margin benefits, and uncertainties in market forecasts for supply availability and load.

2. Avoided Cost Approach to Value Generation Benefits

Characteristically, demand response programs derive most (~90 percent or more) of their generation-related value from avoided capacity costs rather than avoided energy costs.[52] Limited-event demand response programs or tariffs, such as CPP, are designed to help mitigate peak load requirements for short durations, not unlike a peaking resource. Such limited-event resources provide opportunities to displace higher-cost energy only when triggered. However, dynamic pricing and demand response programs can displace the need for a capacity resource (*i.e.*, combustion turbine) during those periods, which can result in significantly more value than the potential for energy displacement.

Procurement benefits include avoided capacity and avoided energy. Avoided capacity benefits include the value of capacity provided by a particular tariff or load control program. The value of capacity is based on the cost of an avoided combustion turbine ("CT") as

52 Other potential benefits may exist which are not discussed here, such as O&M savings.

a proxy. The CT proxy value assumed is $71.55/kW in 2006 and escalated each year or $87.78 levelized over the program period. The value of peak reductions from a CPP tariff is adjusted (de-rated) because of the limitation of an assumed number of CPP events per summer season, compared to a combustion turbine, which is available near 100 percent throughout the year. The value of load control programs is also de-rated for similar limitations. The assumption for avoided peak energy value is $102.54/MWh in 2006 and escalated each year for energy avoided during a CPP event. Both the energy and capacity values are assumed to be "at the generator" level.

The Commission has a long-standing policy of using a combustion turbine (CT or peaker) proxy method for estimating the marginal value of capacity and a system marginal energy cost for estimating the marginal value of energy.[53] SCE's view of marginal capacity value is based on the real economic carrying charge methodology[54] of a CT.

D. Time Differentiating Capacity Values

The marginal capacity value of the CT proxy is an annualized value and not differentiated by time. Thus, SCE has "spread" or allocated the annual marginal capacity value using relative loss of load probability (LOLP) values to indicate time differentiated values based on peak period usage.[55] LOLP is a measure of system reliability that indicates the ability (or inability) to deliver energy to the load. The marginal capacity value of the CT proxy is modified to reflect the operational characteristics of demand response programs relative to those of a combustion turbine. These modifications are implemented through the use of two factors (designated by SCE as "A factor" and "B factor") that reflect the operational characteristics of individual demand response programs. The meaning and derivation of these factors is provided below.

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[53] For economic valuation purposes, the value of capacity is never higher than the cost of a CT since any greater capital investment would be justified by lower energy costs. This concept is known as Energy Related Capital Costs ("ERCC").

[54] Also referred to as the rental value or deferral value method. This is consistent with the real economic carrying charge methodology, as has been done in previous GRC filings. SCE's capacity value is assumed to be "at the generator" level and levelized assuming a utility discount rate.

[55] This approach is a standard utility practice and has been used in prior SCE GRC proceedings.

The *A*-factor is determined by simulating an optimal dispatch of a sample demand response program against an LOLP forecast, and calculating the percentage of time the program is able to "displace" LOLP events, subject to the program's dispatch limitations.

The *B*-factor is based on the difference in value between a day-ahead and a day-of call option for power. A CT is essentially a day-of call option with a strike price equal to the variable operating cost of a CT proxy. The CT proxy value should be adjusted downward for demand response programs that are callable on a day-ahead basis. The CPP program, for instance, is a day-ahead call option resource. For a demand response program that can be dispatched on a day-of basis, the *B*-factor equals 1 by default.[56]

The following table summarizes the A and B factor used to derate the marginal capacity value of a CT proxy.

Table B-29
Marginal Capacity Value of CT Proxy

	TOU	CPP	PTR	Smart Thermostat
A Factor	100%	49%	49%	55%
B Factor	100%	95%	95%	96%
Planning Reserve	15%	15%	15%	15%

E. Energy Marginal Costs

The marginal energy cost forecast is based on the methodology applied in the 2006 GRC[57] which is combination of market-derived forward prices and prices from a fundamentals-based production cost simulation. A blended approach of market forwards and fundamentals is a simple and practical method used to account for the latest market view of power prices in the near term, and to account for the declining liquidity of the market view by incorporating a fundamental view in the long term. The energy marginal cost is applied to the megawatts

[56] If the notification time for a day-of CPP program is greater than the time between dispatching a CT and receiving energy, then the value of the B-factor is less than 1.

[57] SCE's Phase II of 2006 GRC Marginal Cost and Sales Forecast Proposals, SCE-2, May 20, 2005.

avoided for dynamic rates and demand response programs to calculate the energy cost avoided in the business case.

Appendix C

Witness Qualifications

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF AHMAD FARUQUI

Q. Please state your name and business address for the record.

A. My name is Ahmad Faruqui. I am a principal with The Brattle Group, located at 353 Sacramento Street, Suite 1140, San Francisco, CA 94111.

Q. Briefly describe your present responsibilities at The Brattle Group.

A. I am the

Q. Briefly describe your educational and professional background.

A. I hold a Ph.D. in economics from the University of California, Davis. I have published more than a hundred articles, papers and books dealing with dynamic pricing, demand response, energy efficiency, demand-side management and load forecasting. I have previously testified before the Commission in the advanced metering application of Pacific Gas and Electric Company.

Q. What is the purpose of your testimony in this proceeding?

A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit SCE-4, as identified in the Tables of Contents herein.

Q. Was this material prepared by you or under your supervision?

A. Yes, it was.

Q. Insofar as this material is factual in nature, do you believe it to be correct?

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.