

Application No.: 07-07-

Exhibit No.: SCE-3

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An *EDISON INTERNATIONAL* Company

(U 338-E)

***EDISON SMARTCONNECT™ DEPLOYMENT FUNDING
AND COST RECOVERY***

***Exhibit 3: Financial Assessment And Cost Benefit
Analysis***

Before the

Public Utilities Commission of the State of California

Rosemead, California

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EDISON SMARTCONNECT™ DEPLOYMENT FUNDING AND COST RECOVERY

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1 I.

2 INTRODUCTION

3 The purpose of this volume is to present the overall financial assessment and cost benefit
4 analysis for deployment of Edison SmartConnect™, SCE’s proposed advanced metering infrastructure.
5 The cost benefit analysis is a necessary component to assist the Commission in determining the
6 reasonableness of this Application. The results of this analysis provide reasonable assurance that Edison
7 SmartConnect™ will produce customer benefits far in excess of the project costs over the full life of the
8 project.

9 SCE planned its advanced metering project in three phases. During Phase I, in 2006 SCE
10 undertook a complete revision of its cost benefit analysis. When the revised “preliminary” cost benefit
11 analysis was completed in December 2006, the results showed a positive present value revenue
12 requirement (PVRR) of \$101 million.¹ SCE then proceeded with Phase II, focusing on pre-deployment
13 activities during 2007 and revised its preliminary analysis to include updated cost and benefit
14 assumptions as of mid-year 2007, incorporating the results of initial product tests in the lab and
15 responses to its technology request for proposals (RFP). The final cost benefit analysis detailed in this
16 volume concludes the Edison SmartConnect™ project is expected to produce customer benefits of \$109
17 million in PVRR. This represents a \$1 billion improvement over the initial cost benefit analysis
18 presented by SCE in its “best-case” full deployment scenario (Scenario 4) in March 2005.²

19 The improvements that have occurred over the past two years are the result of fast moving
20 technology improvements, some of which were motivated by SCE in its endeavor to deliver a cost
21 effective AMI solution that fully satisfies the Commission’s functionality requirements. The vast
22 improvements in benefits largely result from the incorporation of a remote service (connect/disconnect)
23 switch into the meter, improved communication system coverage and functionality, improved meter life,
24 and refined energy conservation and customer demand response programs based, in part on the enabling

¹ The December 2006 analysis was still considered “preliminary” because some critical information was still unknown pending the results of product testing and the yet to be received responses to SCE’s RFP.

² A. 05-03-026, filed on March 30, 2005.

1 Home Area Network (HAN) interface technology.³ These improvements are described and quantified in
2 SCE's August 2005 *AMI Conceptual Feasibility Report*, which was filed as part of SCE's Phase II AMI
3 Application (A.06-12-026).⁴

4 Chapter II of this volume provides an overview of SCE's overall financial assessment
5 and cost benefit analysis. The results of the cost-benefit analysis are summarized and the
6 analytical approach is described. Chapter II shows that the result of the cost benefit analysis is
7 positive on a PVRR basis.

8 Chapter III includes a detailed discussion of SCE's cost benefit analysis presented in four
9 separate parts. Part A recaps pre-deployment costs currently being incurred in Phase II. Since
10 these pre-deployment costs have already been authorized and largely spent at the time of this
11 proceeding, they could be viewed as "sunk costs." SCE believes, however, that a fair assessment
12 of Edison SmartConnect™ should include these pre-deployment costs since they are an essential
13 part of the total project. Thus, the pre-deployment costs are included in the financial assessment.
14 Part B of Chapter III provides a recap of the estimated costs during the deployment period, 2008-
15 2012, as detailed in Volume 2 (Exhibit SCE-2) of this Application. Part C presents the estimated
16 post-deployment period costs (2013 – 2032) and includes a detailed discussion of the major cost
17 drivers and assumptions. Part D of Chapter III provides a detailed description of the quantifiable
18 benefits of Edison SmartConnect™ during the deployment period (2008-2012) and the post-
19 deployment period (2013-2032). As described in Part D, Edison SmartConnect™ is expected to
20 provide wide ranging operational benefits as well as demand response benefits driven by
21 advanced tariffs, programs and services.

22 Chapter IV explains the non-quantified societal benefits that are likely to result from the
23 deployment of Edison SmartConnect™. Though not included as part of SCE's financial

³ The Home Area Network (HAN) technology enabled by Edison SmartConnect is described in Volume 2 (Exhibit SCE-2) in Chapter III, Part D.3.c.

⁴ See A.06-12-026, Exhibit 4, appending SCE's *AMI Conceptual Feasibility Report* dated August 2006, at Table II-1 on p.7.

1 assessment, the societal benefits of Edison SmartConnect™ are real and should be taken into
2 consideration in assessing the reasonableness of SCE's proposed investment in Edison
3 SmartConnect™.

4 Finally, Chapter V discusses how the nominal dollars detailed in this Exhibit translate to
5 economic value for ratepayers on a present value of revenue requirement (PVRR) basis. Chapter
6 V also describes the estimated ratio between operational benefits and project costs for SCE's
7 Edison SmartConnect™ over the life of the project. The customer rate impacts and the cost
8 recovery mechanism being proposed by SCE in this proceeding are further described in Exhibit
9 SCE-5 of this Application.

1 **II.**

2 **OVERVIEW OF EDISON SMARTCONNECT™ FINANCIAL ASSESSMENT**

3 **A. Summary of Financial Assessment**

4 The financial assessment described in this Exhibit incorporates SCE's expected technology
5 selections and current vendor pricing for full deployment based on SCE's analysis of responses to its
6 Request for Proposals issued in December, 2005. Results of SCE's financial assessment are presented
7 in Table II-1.
8

Table II-1
Project Cost Benefit Analysis Results
(\$Nominal and 2007 Present Value of Revenue Requirement, in Millions, Rounded)

	Nominal	PVRR
Benefits		
Operational Benefits		
During Deployment Years	278.2	
During Post-Deployment Years	4,299.0	
Demand Response Benefits		
During Deployment Years	216.2	
During Post-Deployment Years	2,792.6	
Subtotal Operational Benefits	4,577.2	
Subtotal Demand Response Benefits	3,008.8	
Total Benefits	7,586.0	2,076.0
Costs		
Phase II Costs (Pre-deployment)	45.2	
Deployment Costs		
Acquisition of Meters and Communication Network Equipment	838.0	
Installation of Meters and Communication Network Equipment	296.6	
Implementation and Operation of New Back Office Systems	191.2	
Customer Tariffs, Programs and Services	112.1	
Customer Service Operations	84.1	
Overall Program Management	45.6	
Contingency	147.3	
Post-Deployment Costs		
Billing	127.1	
Call Center	93.5	
Meter Services	399.1	
Back Offices Systems	344.4	
Customer Tariffs, Programs and Services	245.0	
Subtotal Pre-Deployment Costs	45.2	
Subtotal Deployment Costs	1,714.9	1,627.0
Subtotal Post-Deployment Costs	1,209.0	340.0
Total Costs	2,969.1	1,967.0
Total Benefits Less Total Costs	4,616.9	109.0

1 The big difference between nominal dollar benefits and the present value of the same benefits is
2 a function of the time-value of the majority of the expenditures occurring in the early years of the project
3 and the majority of the benefits occurring in later years. The present value analysis effectively
4 normalizes these time-value differences affected by the occurrence of the costs verses the benefits.

5 **B. Analytical Methodology Used to Develop the Cost Benefit Analysis**

6 SCE's analysis is a financial comparison of the present value of estimated Edison
7 SmartConnect™ costs and benefits over the useful life of the new infrastructure. Costs and benefit
8 estimates were derived through a rigorous internal process involving the participation of all affected
9 SCE operating departments and using a consistent set of common assumptions. Each department
10 specified their costs and benefits using a discrete set of Cost-Benefit Identification codes, each of which
11 describes a unique project cost or benefit. SCE Business Units specified their labor impacts by
12 indicating SCE job titles and full-time equivalent employees by year, and specified their nonlabor
13 impacts in constant 2006 dollars.⁵ Contract labor was classified as nonlabor, to ensure accurate payroll
14 loadings.

15 These estimated costs and benefits were then applied to the proposed deployment schedule,
16 incorporated with corporate assumptions for annual meter growth and cost escalation factors over the 26
17 year analysis period starting on January 1, 2007 and concluding on December 31, 2032. The analysis
18 period is the multi-year deployment schedule (2007 through 2012) plus the 20-year useful life of the
19 meters (2013 through 2032). To capture the full useful life of meters installed in the last year of
20 deployment (2012), the analysis extends to 2032. Recognizing that the initial installed Edison
21 SmartConnect™ meters would be more than 20 years old by that time, the analysis assumes a substantial
22 increase in meter failures (and associated costs) as each "vintage" of meters reaches its 20-year service
23 life in 2029, 2030, 2031, and 2032.

⁵ Non-labor estimates were developed in 2006 dollars because that is when this process took place.

1 Annual costs are escalated for inflation and stated in terms of nominal dollars for each year. In
2 the last chapter of this volume the same costs and benefits are stated in terms of PVRR reflecting the
3 customer rate impacts over the life of the project.

4 **1. Labor Cost Estimation**

5 Labor costs were based on the number of full-time equivalent employees multiplied by
6 the annual labor rate for each job title. Labor rates were based on current 2007 SCE market reference
7 points⁶ and labor contracts for each job title, and escalated to the year of incurrence using SCE's
8 proposed 2009 GRC labor escalation rates. Annual labor costs include base wages, results sharing, and
9 payroll loadings such as employee pensions and benefits, and payroll taxes. Payroll loadings (referred
10 to as the Pensions and Benefits or P&B rate) are expressed as a percentage of labor and added to the
11 base labor rates. The P&B rate is based on the incremental costs of health care and other benefit plans,
12 as well as payroll taxes. The P&B rate components were held constant across the business case, with the
13 exception of health care costs, which were assumed to escalate at the rates shown in SCE's 2006 and
14 2009 GRC health care testimony. Project-specific estimates were developed for Workers'
15 Compensation and Claims impacts for the Meter Services Organization (Field Services, Meter Reading
16 and Meter Technicians) because of the significant impact to the organization (meter readers will be
17 virtually eliminated by SmartConnect™), and because of the higher injury risk of these occupations.

18 **2. Nonlabor Cost Estimation**

19 Nonlabor costs are, with certain exceptions, escalated using SCE's proposed 2009 GRC
20 nonlabor escalation rates. The exceptions are Demand Response-related costs, Worker's Compensation,
21 IT non-labor costs, and the SmartConnect™ meters. Demand Response and Worker's Compensation
22 were in nominal dollars at the workpaper level, and no further escalation was required.

⁶ 2006 GRC-approved Market Reference Points with Human Resource's annual adjustments for 2007.

1 **C. Description of Cost/Benefit Estimates**

2 Edison SmartConnect™ project cost and benefit estimates are addressed in Chapter III and
3 presented in nominal dollars in the year they occur. These costs and benefits are addressed in four
4 general categories:

- 5 1. Pre-deployment costs;
- 6 2. Deployment Period costs;
- 7 3. Post-Deployment Costs; and
- 8 4. Benefits (operational and demand response) during the Deployment and Post-Deployment
9 Periods.

10 All included costs are incremental, resulting from Edison SmartConnect™ and do not include
11 any SCE operating and maintenance (O&M) costs or capital costs that would have otherwise been
12 incurred. Any costs that may be displaced or deferred as a result of Edison SmartConnect™ are
13 included as a cost avoidance benefit attributed to Edison SmartConnect™ and will be discussed in the
14 sections on estimated benefits.

15 **D. Societal Benefits of Edison SmartConnect™**

16 Although not quantified, societal benefits are very real and are an important consideration in
17 determining the reasonableness of Edison SmartConnect™. Societal benefits of Edison
18 SmartConnect™ include improvements in customer experience, reductions in energy theft, reduction of
19 green house gases and other potential environmental benefits, as well as benefits expected to result from
20 other Edison SmartConnect™ capabilities. These societal benefits do not directly impact SCE's revenue
21 requirement and they have not been incorporated into SCE's financial assessment of Edison
22 SmartConnect™. Societal benefits are discussed in more detail in Chapter IV of this volume.

23 **E. Edison SmartConnect™ Revenue Requirement and Ratepayer Impacts**

24 The cost effectiveness of Edison SmartConnect™ as it relates to the ratepayer incorporates
25 financial considerations using standard PVRR calculation methods. The return on investment used for
26 determining ratepayer impacts is the return on rate base currently authorized by the Commission.

1 SCE summarized the results of its financial assessment of Edison SmartConnect™ in terms of
2 the impacts the program will have on its ratepayers. As detailed in Chapter V of this Exhibit, the overall
3 impact of Edison SmartConnect™ on SCE's ratepayers is estimated to be net positive \$109 million in
4 2007 present value dollars.

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III.

EDISON SMARTCONNECT™ FINANCIAL ASSESSMENT

This Chapter presents the discussion of Edison SmartConnect™ costs and benefits in three distinct time-periods: the pre-deployment period, which includes costs incurred from January 2007 through December 2007;⁷ the deployment period, which includes costs and benefits incurred from January 2008 through December 2012;⁸ and the post-deployment period, which includes the costs and benefits for the remainder of the project through December of 2032.

Since SCE’s pre-deployment costs are already authorized by the Commission,⁹ they will not be discussed in detail in this Exhibit. Instead, SCE provides a recap of the costs approved by the Commission for Phase II, and verifies that these pre-deployment costs are all included in SCE’s financial assessment of the overall costs effectiveness of the Edison SmartConnect™ program.

Deployment Period activities and costs are discussed in detail in Exhibit SCE-2 of this Application, and are summarized in this Exhibit. The benefits of the deployment period are summarized in Exhibit SCE-2, and discussed in detail in this Exhibit. All deployment period costs and benefits are also included in the overall cost benefit analysis.

The costs and benefits of the post-deployment period, which includes the calendar years 2013 through 2032, are described in detail in this Exhibit. Thus, SCE’s cost benefit analysis includes all costs and benefits incurred or estimated over the entire analysis period from January 2007 through December 2032.

A. Recap of Pre-Deployment Costs

SCE’s estimated cost for pre-deployment activities of \$45.22 million was authorized in Decision 07-07-042. There are no quantifiable benefits expected during the pre-deployment activities of 2007. At the time of this Application filing, Phase II activities are on schedule and for purposes of the financial

⁷ Pre-deployment costs were authorized by the Commission in D.07-07-042, issued July 26, 2007.

⁸ This Application also seeks recovery through the balancing account of approximately \$8 million in 2007 costs which were classified as “deployment” costs by D.07-07-042, and which will be recorded in the AMIMA during 2007.

⁹ See D.07-07-042.

1 assessment, it is assumed that the pre-deployment costs will equal the full \$45.22 million authorized by
2 the Commission in D.07-07-042.

3 **B. Summary of Costs Incurred During the Deployment Period (2008 through 2012)**

4 This section summarizes the detailed explanation provided in Exhibit SCE-2 of SCE's forecast
5 costs of Edison SmartConnect™ during the Deployment Period. Deployment Period costs are organized
6 into five functional areas and include a provision for contingencies as summarized in Table III-2 below.
7 The total costs during the Deployment Period are estimated to be \$1.7 billion in nominal dollars.

Table III-2
Summary of Estimated Costs During the Deployment Period
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Acquisition of Meters and Communication Network Equipment	1.6	836.5	838.0
Installation of Meters and Communication Network Equipment	79.6	216.9	296.6
Implementation and Operation of New Back Office Systems	41.4	149.8	191.2
Customer Tariffs, Programs and Services Costs	112.1	0.0	112.1
Customer Service Operations	78.9	5.2	84.1
Overall Program Management	37.5	8.1	45.6
Contingency	33.0	114.3	147.3
Costs Totals	384.2	1,330.7	1,714.9

8 **C. Post-Deployment Costs (2013 through 2032)**

9 The forecast costs for the post-deployment period are an essential part of the overall cost
10 effectiveness analysis of the Edison SmartConnect™ program. Upon completion of the deployment of
11 Edison SmartConnect™, the post-deployment activities will become part of SCE's on-going operations
12 at that time. As such, SCE expects the ratemaking considerations related to these post-deployment costs
13 and benefits to be reflected in its General Rate Case proceedings beginning in 2012. The post-
14 deployment period costs are those incremental expenses that SCE expects to incur after the full

deployment of Edison SmartConnect™ over and above the costs that would be expected if Edison SmartConnect™ were not deployed. SCE anticipates the majority of these ongoing costs will be in the form of O&M expenses. These estimated steady-state incremental costs include the forecast costs to maintain the Edison SmartConnect™ field infrastructure and back office systems, and the costs to support new customer tariffs, programs and services. The estimated costs of additional Edison SmartConnect™ meters required for both customer growth and replacement of failed Edison SmartConnect™ meters are included.¹⁰ Other costs in this category include the incremental costs incurred in the Billing Organization and the call center, and incremental costs to address load forecasting complexities involving enhanced near real-time data available through Edison SmartConnect™.

1. Summary of the Post-Deployment Incremental Cost Estimate

SCE expects to spend \$1.2 billion of nominal dollars in steady-state incremental costs over 20 years of the post-deployment period. Table III-3 summarizes these costs by operational area.

Table III-3
Summary of Post-Deployment Estimated Incremental Costs
(Nominal Dollar in Millions, Rounded)

	O&M	Capital	Totals
Billing	127.1	0.0	127.1
Call Center	93.5	0.0	93.5
Meter Services	104.2	294.9	399.1
Back Office Systems	247.8	96.6	344.4
Customer Tariffs, Programs and Services	245.0	0.0	245.0
Totals	817.6	391.4	1,209.0

The following subsections provide additional discussion about the costs expected during the post-deployment period.

¹⁰ SCE’s cost-benefit analysis includes the full cost of purchasing and maintaining SmartConnect meters for the forecast customer growth and routine meter replacements between 2009 and 2032 and offsets these costs with benefits that include the full avoided cost of new meters for customer growth and routine meter replacements.

1 **2. Post-Deployment Incremental Operating Cost Drivers and Assumptions**

2 a) Billing Costs

3 The Billing costs primarily relate to an increase in manual processing of billing
4 usage exceptions (*i.e.*, usage problems that require human intervention to resolve in order to correctly
5 bill customers) that are expected after the Deployment Period and driven by new tariffs, programs and
6 services. SCE expects a fairly dramatic increase in billing in the number of usage analyses requested by
7 customers due to more advanced tariffs and the availability of usage data. SCE also expects billing
8 analysis to increase in complexity as a result of the interval meter reads available with Edison
9 SmartConnect™. This increase is expected to begin during the Deployment Period and continue into
10 the Post-Deployment Period.¹¹ As such, the majority of the costs in this area are for labor required to
11 manage the increase in customer service billing requests driven by the exponential growth in customer
12 usage information. As shown in Table III-4, SCE forecasts the \$127.1 million in incremental O&M
13 expenses for its billing operations, in the Post-Deployment Period, and estimates 64 percent to be
14 attributed to exceptions processing.

Table III-4
Estimated Post-Deployment Incremental Operating Costs –
Billing Operations
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
New Bill Presentation and Processes	46.0	0.0	46.0
Exception Processing	81.2	0.0	81.2
Totals	127.1	0.0	127.1

15 b) Call Center

16 A significant increase in call volume to SCE’s call centers is expected to start
17 during the Deployment Period and continue during the Post-Deployment Period. Costs associated with
18 fielding calls include the per-minute costs of SCE’s voice response unit (VRU) and customer service

¹¹ SmartConnect will collect hourly data for most residential and small commercial customers and 15-minute data for medium and large commercial and industrial customers.

1 representatives. In addition, in order for the customer to confirm that the premises are safe for electrical
2 service to resume, SCE assumes that all service activation requests will require an additional phone call
3 to the call center where 25 percent of those calls will be handled by a Call Center representative and the
4 remaining 75 percent will be handled through the use of the VRU.

5 For calls related to disconnection and reconnection of service, SCE assumes that
6 the more efficient automatic disconnect capability of Edison SmartConnect™ (over the manual
7 disconnect process used today) will result in approximately 129,000 more disconnections per year. This
8 increased volume is assumed to translate to two calls to the Call Center per disconnection where 66
9 percent of those calls will be handled by a Call Center representative and 34 percent will be handled
10 through the VRU. In terms of reconnections, SCE assumed that all these 129,000 additional
11 reconnections will require a call to the Call Center where 25 percent will be handled by an SCE Call
12 Center representative and 75 percent will be handled by the VRU.

13 Finally, for pre-payment service, SCE assumes that 60 percent of those calls will
14 be handled by a Call Center representative and 40 percent will be handled through the VRU. Of the 60
15 percent of prepayment calls handled by a Call Center representative, 70 percent of those calls will be
16 handled by SCE's outsourced call center for credit-related calls while the remaining 30 percent will be
17 handled by an SCE Call Center representative.

18 The incremental cost of the Call Center cost drivers is estimated at \$93.5 million
19 in O&M expenses during the Post-Deployment Period. Table III-5 shows that \$58.9 million (63
20 percent) of the anticipated increase in call center costs will be attributed to a significant increase in call
21 volume due to customer impacts from Edison SmartConnect™.

Table III-5
Estimated Post-Deployment Incremental Operating
Costs – Call Center
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Increased Call Volume	58.9	0.0	58.9
Reconnection Order Handling	34.5	0.0	34.5
Totals	93.5	0.0	93.5

c) Meter Services

The need to acquire new meters for customer growth and replacing failed meters is an ongoing cost expected to continue during the Post-Deployment Period. SCE will require capital dollars to purchase Edison SmartConnect™ meters on an on-going basis after deployment. For modeling clarity, the entire estimated cost of Edison SmartConnect™ meters for both initial deployment and customer growth is included as a cost, offset in part by the avoided cost of procuring electromechanical and solid-state meters, which is included as a capital benefit during the deployment and post-deployment periods. SCE assumes that the labor for installation of growth meters would occur at the same rate as the costs that would have been incurred without Edison SmartConnect™. As a result, the costs for installation of growth meters are not included in this analysis.

The estimated meter operation and maintenance costs also include the incremental cost of travel time for Field Service Representatives (FSRs) to handle the remaining field service orders. With fewer total orders, each FSR will be required to cover a larger territory performing their remaining work and will spend a larger proportion of time traveling. Additional meter technicians and FSRs will be required to work trouble reports and replace faulty meters. The driver for the meter failure cost is the failure rate assumed for the new meters. SCE assumed that one percent of the entire meter population per year will require a visit by an FSR or meter technician to resolve a trouble order where the meter will be replaced with a new Edison SmartConnect™ meter. SCE then reduced these costs by the current costs associated with trouble reports for existing meters to estimate the incremental cost impact.

Table III-6 shows that meter services costs during the Post-Deployment Period are forecast at \$294.9 million in capital expenditures and \$104.2 million in O&M expenses. The estimated capital expenditures are primarily for the purchase of meters, which equates to 78 percent of the total Meter Services capital forecast. The balance of the Meter Services capital expenditures is related to the normal capitalization of installation labor, equipment and tools for meter testing and maintenance.

Table III-6
Estimated Post-Deployment Incremental Operating
Costs – Meter Services
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Meter Operations and Maintenance	104.2	64.8	169.0
Meter Purchases	0.0	230.0	230.0
Totals	104.2	294.9	399.1

d) [Back Office Systems](#)

The combination of exponential increases in customers’ usage data and managing Edison SmartConnect™ enabled tariffs, programs and services for over five million customer accounts will require significant ongoing expansion and management of automated data management and more complex communication network infrastructure. The Back Office Systems costs include the ongoing capital and O&M required to maintain a back office with a considerable increase in hardware, especially storage capacity, and communications network equipment. In addition, the major applications required by Edison SmartConnect™, such as the Meter Data Management System (MDMS) and the Network Management System (NMS), will require ongoing licensing and maintenance, as discussed in Exhibit SCE-2 for the deployment period.

As show in Table III-7, the Post-Deployment Period expenditures for SCE’s back office systems are forecast to be \$344.4 million. These costs are organized in the same areas as the Deployment Period costs: load control systems; back office systems; and the combination of the MDMS and NMS. The ongoing maintenance of these three areas requires both capital expenditures and

O&M expenses. The capital expenditures include software, processors and storage servers. The O&M expenses are primarily driven by the labor required to maintain and operate the back office assets, which require attention 24 hours a day, 365 days a year.

Table III-7
Estimated Post-Deployment Incremental Operating
Costs – Back Office Systems
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Load Control Systems	6.1	1.7	7.8
Back Office Maintenance	18.5	18.0	36.5
MDMS and NMS Maintenance	223.2	76.8	300.0
Totals	247.8	96.6	344.4

e) Customer Tariffs, Programs and Services

As discussed in Exhibit SCE-2, SCE expects to implement new demand response options for Edison SmartConnect™ customers during the deployment period. Implementation and maintenance of these programs requires a major marketing program to obtain and maintain an optimal level of customer participation. These activities are expected to continue during the post-deployment period. SCE plans to conduct research on an ongoing basis to assess customer satisfaction and collect customers’ suggestions for improvements. Research is expected to be conducted to gauge the effectiveness of SCE’s marketing tactics, marketing channels and the overall effectiveness of Edison SmartConnect™ enabled tariffs, programs, and services. This research is then used to modify the tariffs, programs and services as necessary and adjust SCE’s marketing tactics. Finally, SCE will have to maintain the operations necessary to successfully implement the programs.

Table III-8 shows that SCE forecasts \$245.0 million of ongoing O&M expenses during the Post-Deployment Period for the activities in Customer Tariffs, Programs and Services. SCE plans to use 56 percent of these costs for marketing, such as customer outreach, education and advertising, to help drive the adoption and retention of customer participation in dynamic rates, and demand response programs and energy conservation enabled by Edison SmartConnect™.

Table III-8
Estimated Post-Deployment Incremental Operating
Costs – Customer Tariffs, Programs and Services
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Marketing	137.4	0.0	137.4
Market Research	15.8	0.0	15.8
Demand Response Administration	64.8	0.0	64.8
PCT Rebates	27.0	0.0	27.0
Totals	245.0	0.0	245.0

D. Benefits during the Deployment and Post-Deployment Periods

The benefits from Edison SmartConnect™ begin to occur in the early stages of full scale deployment in 2008 and continue for the duration of the Post Deployment period through 2032. These benefits are presented below as either Operational Benefits or Demand Response benefits.

1. Operational Benefits

Operating benefits are primarily those operating expenses that SCE expects to avoid after the full deployment of Edison SmartConnect™ and over the life of the new infrastructure. SCE estimates Edison SmartConnect™ to provide \$4.6 billion of operational benefits during the life of the project, the majority of which are expected to be realized during the Post-Deployment Period. The Table III-9 summarizes these estimated benefits and is followed by a detailed explanation of each contributing area.

Table III-9
Estimated Operational Benefits
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Meter Services	3,491.4	417.6	3,909.1
Billing Operations	422.4	0.0	422.4
Call Center	95.8	0.0	95.8
Transmission and Distribution	77.9	13.9	91.8
Other	41.7	16.5	58.1
Totals	4,129.2	448.0	4,577.2

a) Meter Services Operational Benefits

(1) Category Description

One of the areas significantly impacted by Edison SmartConnect™ is the Meter Services Organization (MSO), since many of the meter services now accomplished manually will be automated. These services include: (1) routine monthly manual meter reading, (3) the manual disconnection and reconnection of service (for nearly all residential meters), and (4) supervision and support associated with these manual activities. Accordingly, the vast majority of benefits of Edison SmartConnect™ come from the savings associated with automating many of the manual meter services activities currently in place today.

(2) Summary of the Meter Services Operations Benefit Estimate

To estimate the labor O&M savings for Meter Services Operations, SCE started with the recorded 2006 staffing levels for SCE's Meter Reading and Field Services organizations. Current activity levels were determined for each of the impacted areas. In the case of Field Services activities, impacts to ongoing work (additional drive time due to the reduced number of Field Services Representatives) were also evaluated. In the case of routine meter reading, SCE presently expects that this activity will be virtually eliminated with Edison SmartConnect™, so its benefit estimate includes the elimination of all meter readers and meter reader supervisors. SCE assumes that any incidental meter reading activities such as pick-up reads will be performed by remaining FSRs. Also included in this benefit estimate is the number of meter readers and field service representatives that

1 would otherwise be added each year between 2008 and 2032 due to projected customer growth. In the
2 case of off-cycle “pickup” reads, SCE determined the amount of Field Services labor that is currently
3 devoted to this task. Next, SCE determined the amount of Field Services labor that is devoted to field
4 on and off orders as well as credit-related disconnection and reconnection activity. An estimated 90
5 percent of this work is expected to be eliminated by Edison SmartConnect™. The combination of these
6 analyses results in a forecast reduction in Field Services staffing after Edison SmartConnect™ meters
7 are installed.

8 SCE also estimated the non-labor benefits, or savings, associated with
9 labor reductions such as vehicle costs, worker’s compensation costs, facility costs, and claims costs.
10 These benefits are all based on recorded levels of expenses, trended forward and pro-rated based on the
11 number of meter readers and field services representatives anticipated to be reduced as Edison
12 SmartConnect™ is deployed.

13 The meter procurement benefits, including Engineering and Meter Shop
14 activities, were handled differently than the other operational benefits described in this section. The
15 benefits in this area come from the elimination of the need to procure electromechanical meters for new
16 customer growth, for electronic Interval Data Recording (IDR) meters for customers requesting changes
17 to Time-of-Use rates, and for meter failures where SCE would have had to purchase replacement meters.
18 The total avoided material cost of the electromechanical meters that SCE expects would otherwise have
19 been installed but for Edison SmartConnect™ are included as a benefit. This benefit is calculated based
20 on the proposed costs of non-RTEM meter taken from the 2009 GRC annual meter capital forecast and
21 projecting them forward.¹² SCE expects the labor required for installing growth meters will not change
22 as result of Edison SmartConnect™.

23 Table III-10 shows the areas of benefits expected in SCE’s Meter Services
24 Organization operations as a result of Edison SmartConnect™.

¹² SCE’s 2009 GRC Application Notice of Intent includes these costs as “business as usual costs.” Therefore they are offset as a ‘benefit’ in this application to avoid double counting.

Table III-10
Estimated Operational Benefits – Meter Services¹³
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Meter Reading	1,767.0	63.3	1,830.2
Field Services	1,205.4	28.0	1,233.4
Avoided Cost of Procuring Interval and Electromechanical Meters	6.3	326.4	332.6
Field Vehicles	258.0	0.0	258.0
Workers Compensation	254.8	0.0	254.8
Totals	3,491.4	417.6	3,909.1

(3) Meter Services Benefit Drivers

Under the category of Meter Services Organization operations, the primary drivers of benefits are the on-demand and scheduled remote-read features of the Edison SmartConnect™ meter, and the remote connect/disconnect capability of the integrated service switch.¹⁴ SCE determined through the “Use Case” process undertaken in the Concept Design stage of Phase I that an integrated service switch in the meter would have numerous uses, including the automation of a significant amount of field activity.

The “retained” field services activities are those field services activities which cannot be automated (primarily installation and maintenance of the meters), and personnel in some of SCE’s rural districts where a fixed minimum staffing level is needed.

In summary, the Meter Services benefits include:

- The labor otherwise required to read meters on-cycle and off-cycle, to install IDR meters for rate changes, to perform routine testing of the

¹³ Includes meter reading and field services in rural areas of SCE’s service territory.

¹⁴ SCE anticipates that all Edison SmartConnect meters for electric service of 200 amps or less will have an integrated remote service connect/disconnect switch. This service switch also has load limiting capability. At this time SCE only plans to use the remote disconnect/reconnect capability on residential accounts because only a subset of commercial (GS-1) accounts are single phase and under 200 amps and would have the service switch in the meter. The 200-amp criteria include approximately 93% of SCE’s service accounts.

1 existing meter population for a period of time prior to replacement of
2 the existing meters with Edison SmartConnect™ meters, and to
3 perform field disconnect and reconnect activities.

- 4 • The pensions and benefit expenses associated with that labor.
- 5 • The vehicle expenses, workers' compensation expenses, claims
6 expenses, and facility expenses associated with that labor.
- 7 • The elimination of procuring electromechanical meters for new
8 business, IDR meters for rate changes, and failure replacements.

9 b) Billing Benefits

10 (1) Category Description

11 Billing benefits primarily consist of improvements in the efficiency of the
12 billing process, improvements in SCE's working capital requirement, and reductions in O&M expenses.

13 (2) Summary of the Billing Benefits Estimate

14 Billing operations provide timely and accurate billing services to SCE's
15 4.8 million customers. In 2006, SCE's back office systems issued over 56 million customer-billing
16 statements. SCE also processes nearly two million manual billing exceptions annually. Implementation
17 of Edison SmartConnect™ is expected to allow vast improvements in billing exception processing.

18 The largest component of billing benefits will come from reductions in
19 SCE's working capital. Working capital will reflect reductions in unbilled revenue from Summary
20 Accounts and a reduction in bad debt expense due to more rigid enforcement of SCE's disconnect
21 policies. Summary Billing process efficiencies will come from the ability to synchronize billing reads
22 for those accounts, thus virtually eliminating unbilled revenue for these accounts. Summary Billing
23 provides a convenient billing service which allows the customer to receive just one bill for their energy
24 consumption at multiple locations. Presently, SCE reads electric meters in geographic sequence within
25 individual service districts. Summary Billing accounts may have individual service accounts located in
26 different routes, cities, districts, and counties – making it impractical and costly to obtain those reads in
27 a coordinated fashion. As a result, one service account may be read on the first day of each month, but

1 that service account remains unbilled until the final service account on the Summary Billing statement is
2 read, which may be the 10th day of the month or the 20th day. Upon full deployment of Edison
3 SmartConnect™ SCE will be able to read and bill a customer for all of their accounts on the same day,
4 which will reduce billing and payment lag, reduce the Accounts Receivable balance, and therefore
5 reduce working capital.

6 Additional, working capital reductions will result from reductions in bad
7 debt expense because of SCE's proposed prepayment service. SCE's "Use Case" process¹⁵ identified an
8 opportunity to offer prepayment services as a result of the remote connect/disconnect and on-demand
9 meter reading functionality of the Edison SmartConnect™ meter. SCE expects that some customers
10 facing difficulty establishing credit or meeting the utility's deposit requirements, or those on fixed
11 incomes would choose the prepayment service. The prepayment service would result in two major
12 benefits to SCE: (1) an improvement in cash flow (working capital), as electricity would be paid for
13 prior to consumption instead of afterward; and (2) a reduction in bad debt expense, as SCE anticipates
14 customers most at-risk for write-off would enroll in this service.

15 Another Billing benefit associated with bad debt expense reduction arises
16 from SCE's ability to enforce its existing disconnect policies more rigorously. At present, field
17 disconnect orders are not scheduled on Fridays, Saturdays or Sundays,¹⁶ and are prioritized in the work
18 schedule after other customer related work on the other four weekdays. The cost of a field visit to
19 disconnect service is not trivial, so SCE does not typically disconnect for balances below \$30. As a
20 result, less than half of warranted disconnects are actually performed. With Edison SmartConnect™
21 remote connect/disconnect capability, SCE can automatically disconnect service when warranted under
22 SCE's tariffs.

23 Finally, SCE anticipates some labor savings in billing operations. The
24 Edison SmartConnect™ system will provide more accurate billing data, more timely completion of on

¹⁵ The "Use Case" process was a Phase I activity to identify the potential uses for AMI.

¹⁶ SCE's tariffs provide for higher reconnection charges on weekends. As a matter of policy, SCE does not wish to force its customers to pay the higher weekend-reconnection charge, which prevents disconnect work Friday-Sunday.

and off orders, and improved data validations provided by the new Meter Data Management System, resulting in reduced billing exceptions. Currently, SCE manages and manually performs over 1 million service changes each year, due to customers moving. Most if not all of these services changes can be automatically performed given the remote connect/disconnect capability of the new meters. This reduces the likelihood of inconsistencies in customer in-service and out-of-service dates, resulting in reduced need for exception processing.

Table III-11 details the estimated billing benefits, in nominal dollars, resulting from reductions in bad debt expenses, improvements to cash-flows, and reductions in billing O&M expenses.

Table III-11
Estimated Operational Benefits – Billing Operations
(Millions of Nominal Dollars, Rounded)

	O&M	Capital	Totals
Cash Flow Improvement	230.0	0.0	230.0
Bad Debt Reduction	91.2	0.0	91.2
Billing Exceptions Reduction	101.2	0.0	101.2
Totals	422.4	0.0	422.4

(3) Billing Benefit Driver

The primary driver for billing related benefits is the prepayment services, which SCE expects to begin offering in the Post Deployment Period. SCE estimates that there is more than 8% of SCE’s residential customers that will opt for the prepayment service. This estimate is based on results to-date from Salt River Project,¹⁷ consumer trends in other service industries, and socioeconomic trends for SCE’s customer bases. SCE expects that its residential customer adoption of prepayment will ramp-up over time as customers become accustomed to this new method of payment and its benefits such as improved budgeting, ease of direct automated payments and their natural energy conservation behavior which can reduce their overall energy costs. This driver affects both the bad debt reduction and the cash-flow improvement benefit estimates, as discussed above.

¹⁷ Based on interviews conducted in 2006 with Salt River’s Prepayment Project team members.

1 The second strong driver of billing related benefits is the cash flow
2 improvements anticipated from reducing the amount of unbilled revenue from Summary Billing
3 accounts. Because this cash flow would accrue to working capital, which is a component of rate base,
4 SCE has valued this cash flow improvement at the same long-term cost of capital used to calculate the
5 revenue requirement impact of the Edison SmartConnect™ business case, and to discount the cash flows
6 to ratepayers.

7 SCE has used recorded data on its Summary Billing accounts to determine
8 the total revenue, as well as the average “lag,” for its existing accounts. In addition, while Summary
9 Billing revenue was assumed to grow at the rate of overall customer growth, no growth in the
10 proportions of service accounts on Summary Billing was assumed.

11 SCE has consistently used its long-term cost of capital throughout this
12 case to discount costs and benefits alike. Since any change in Summary Billing lag or prepaid service
13 payments would flow directly to SCE’s working capital accounts, and these accounts are included in the
14 calculation of rate base in each General Rate Case, this rate is appropriate to use to value the benefit of
15 accelerating customer payments for electric service.

16 c) Call Center Benefits

17 (1) Category Description

18 The primary call center benefit will be a reduction in O&M expenses
19 resulting from advanced capabilities of Edison SmartConnect™.

20 (2) Summary of the Call Center Benefits Estimate

21 This section summarizes the call center benefits, in nominal dollars,
22 resulting from Edison SmartConnect™. SCE’s call centers received approximately 13.4 million calls in
23 2006. A portion of these calls were handled by automated systems, however, the majority of calls (8.7
24 million) were handled by an SCE Call Center Specialist and outsourced business partners.
25 Implementation of Edison SmartConnect™ anticipates significant improvements and efficiencies in
26 each of SCE’s operational areas, which SCE expects will help improve customer satisfaction. The two

1 primary call types to be impacted by Edison SmartConnect™ are: connection related calls (*i.e.*, connect,
2 disconnect and reconnect) and billing related calls.

3 First and foremost, after-hour customer calls requesting estimated service
4 reconnection times will be reduced. Presently, SCE’s Call Centers experience significant call volumes
5 from customers waiting for service to be connected or reconnected. Since the Edison SmartConnect™
6 system will enable same day¹⁸ remote service connections, these customers’ calls should be virtually
7 eliminated.

8 In addition, SCE forecasts a reduction in billing inquiry calls, resulting
9 from more timely and accurate billing. Billing calls include calls related to high cost bills, delayed or
10 first bills, and estimated or incorrect bills. High cost bills require the greatest amount of a Customer
11 Service Representatives time to handle and complete. Edison SmartConnect™ is expected to reduce this
12 need by helping to empower customers to manage their electricity usage and costs. Edison
13 SmartConnect™ is expected to reduce customer calls pertaining to delayed bills. Delayed bills are
14 primarily caused by inconsistent meter reads, lack of access to meters (locked out), no-reads, inaccurate
15 reads, or inability to read meters due to safety concerns. Edison SmartConnect™ is also expected to
16 virtually eliminate estimated meter reads because data will be transmitted electronically.

17 Table III-12 details the estimated call center benefits, in nominal dollars,
18 resulting from reductions in call lengths and volumes.

Table III-12
Estimated Operational Benefits – Call Center
(Millions of Nominal Dollars)

	O&M	Capital	Totals
Billing Inquiry Reductions	23.1	0.0	23.1
Service Restoration Inquiry Reductions	72.7	0.0	72.7
Totals	95.8	0.0	95.8

¹⁸ Safety considerations will require that customers who make satisfactory payment arrangements must then confirm the premises are safe before the meter can be energized. This may take the form of a second customer call or other means of confirmation.

1 replace equipment at the end of its useful life. Peak demand is the primary independent variable in
2 designing the appropriate transformers, substations, wires and other materials required for maintaining a
3 reliable transmission and distribution infrastructure. Based on the expected reductions in peak demand
4 due to Edison SmartConnect™ enabled demand response programs, SCE expects to be able to defer
5 some of these maintenance related capital improvements during the life of Edison SmartConnect™.
6 These deferred maintenance cost savings are included as demand response benefits.

7 (b) TDBU Operations

8 TDBU Operations is responsible for servicing the components of
9 SCE's grid infrastructure on an ongoing basis. In addition, TDBU Operations also provides the labor
10 and expertise required to fulfill emergency repairs to replace unexpected failures within the grid. Most
11 of these failures are related to transformer failure, which may occur for a variety of reasons (*i.e.*,
12 overloading, manufacturing defects, vandalism, *etc.*). The costs associated with emergency repairs are
13 generally more expensive because they often require overtime for SCE's crews.

14 Transformer loadings are currently calculated by associating
15 individual meters with transformers in a database and then using loading factor estimates to translate
16 monthly cumulative kWh usage into a "peak load" estimate. With Edison SmartConnect™, actual
17 hourly kWh usage can be used to identify overloaded transformers, which can then be scheduled for
18 replacement on a more proactive versus reactive basis, thus decreasing expensive emergency repairs in
19 TDBU Operations.

20 Another way Edison SmartConnect™ benefits TDBU Operations
21 is a significant reduction of false "no-power" service calls. At present, SCE's call centers have no way
22 to verify if a meter has power when customers call about power outages. Many times, the call centers
23 will notify TDBU Operations to send a troubleman to the customer's premise only to find that the meter
24 is in fact energized, and the problem is on the customer's side of the meter, thus beyond SCE's
25 jurisdiction. With Edison SmartConnect™, the call center staff will be able to send a signal to the meter
26 and verify whether the meter is energized while the customer is on the phone. As a result, false "no-
27 power" service calls can be virtually eliminated with Edison SmartConnect™ system wide.

1 (2) [Summary of Transmission and Distribution Operational Benefit Estimate](#)

2 Table III-13 shows the operational benefits SCE expects from reduced
3 overtime costs for emergency transformer repairs and reduced field visits for “no-power” calls, as a
4 result of Edison SmartConnect™.

Table III-13
Estimated Operational Benefits – Transmission and Distribution
(Millions of Nominal Dollars)

	O&M	Capital	Totals
Reduced Overtime Costs for Emergency Transformer Repairs	0.0	13.9	13.9
Reduced Field Visits for "No-Power" Calls	77.9	0.0	77.9
Totals	77.9	13.9	91.8

5 (3) [TDBU Benefit Drivers](#)

6 The primary business case driver for avoided “no-power” calls is the pace
7 of meter deployment, as these benefits ramp-up in proportion to the number of customers whose meters
8 can be checked prior to sending a troubleman. The primary business case driver for transformer loading
9 benefits is the completion of meter deployment, as transformer loading analysis cannot reasonably be
10 upgraded until all Edison SmartConnect™ meters have been activated.

11 The number of “no-power” calls is currently estimated at 65 per day, and
12 these customer visits require one hour of labor for each call. Eliminating unnecessary field visits related
13 to these calls will reduce labor costs.

14 The difference between replacing a transformer during normal work hours
15 and replacing it on overtime is approximately \$1,300. While no predictive maintenance system is
16 perfect, SCE believes that with full deployment of Edison SmartConnect™, together with the
17 development of a new predictive transformer loading replacement program, overtime costs associated
18 with responding to 50 percent of the approximately 1,700 x 0.75 transformer failures per year can be
19 avoided.

In summary, the TDBU operations benefits include:

- Reduced labor otherwise required to respond to customer “no-power” calls, where the meter is actually energized.
- Reduced overtime labor associated with replacing overloaded transformers after they fail.
- Reduced pensions and benefit expenses associated with that labor.
- Reduced vehicle expenses associated with that labor.

e) Other Benefits

(1) Category Description

The Other Benefits arising from Edison SmartConnect™ are expected to occur related to the elimination of the existing Customer Data Acquisition System (CDAS) and from the availability of near real-time system load data that is expected to improve the forecasting capabilities of the Energy Supply and Management organization.

(2) Summary of the Other Benefits Estimate

Table III-14 breaks down the estimated contributions of Other Benefits.

Table III-14
Estimated Operational Benefits – Other
(Millions of Nominal Dollars)

	O&M	Capital	Totals
Energy Supply and Management	15.9	0.0	15.9
Back Office Systems	25.8	16.5	42.3
Totals	41.7	16.5	58.1

(3) Other Benefit Drivers

The load forecasting benefits are based on power procurement cost savings that are expected to result from an assumed increase in forecasting accuracy. This improvement in load forecasting accuracy results from replacing load-profile sample data with actual interval data for all SCE customers. The expected decommissioning of the CDAS system will result in the elimination of costs to maintain the system and associated computing devices currently supporting CDAS personnel.

1 **2. Demand Response Benefits during the Deployment and Post Deployment Periods**

2 A significant portion of the benefits derived from Edison SmartConnect™ is attributed to
3 the expected demand response (DR) benefits. Edison SmartConnect™ is aimed at supporting the
4 Commission’s energy policy objectives, especially with regard to enhancing the state’s demand response
5 capabilities. Exhibit SCE-4 is dedicated to detailing the tariffs and programs expected to be
6 implemented as a result of Edison SmartConnect™. Exhibit SCE-4 also provides details about the
7 underlying assumptions for calculating the expected avoidance of the energy and capacity costs from
8 Edison SmartConnect™ enabled demand response. The following sections summarize SCE’s
9 expectations of benefits for Edison SmartConnect™ enabled demand response capabilities.

10 a) Category Description

11 Demand response benefits accrue because Edison SmartConnect™ enables
12 dynamic pricing, better customer information about usage and energy costs and load control programs
13 enhanced by two-way communications. These attributes contribute to providing SCE customer
14 generation and energy procurement cost savings as well as savings from transmission and distribution
15 infrastructure capital deferrals. The transmission and distribution benefits were described in Section 1.d
16 above. The energy procurement related benefits are classified as O&M (ERRA) benefits and described
17 below.

18 b) Summary of the Demand Response Benefit Estimate

19 Demand Response benefits fall into two major groups: (1) Price Response, where
20 customers take actions as a result of adopting a Time-of-Use (TOU) or Critical Peak Pricing (CPP)
21 tariff, and (2) Load Control, where the Edison SmartConnect™ system activates one or more customer-
22 premise devices in response to a utility signal to curtail load, for economic or system stability purposes,
23 or customers respond to a pay-for-performance rebate program.

24 Table III-15 shows forecast demand response driven benefits for avoided capacity
25 and energy costs resulting from the five demand response components. The time-differentiated tariffs,
26 TOU and CPP, represent 14 percent of these estimated savings. The demand response programs, PCT
27 and PTR, are expected to provide 63 percent of these estimated savings. The remaining 23 percent of

these estimated savings is expected to be derived from growth in energy conservation by customers as a result of energy information from the Edison SmartConnect™ system via the internet. Additional conservation may result from access to near real time information from the meter to customer’s in-home display enabled by the HAN interface.

In addition, SCE expects an additional \$221.5 million of deferred capital benefit in TDBU engineering as a result of Edison SmartConnect™. The total estimated demand response benefits over the project life are forecast at \$3,008.8 million.

Table III-15
Estimated Demand Response Benefits
(Millions of Nominal Dollars)

	O&M	Capital	Totals
Avoided Capacity and Energy Costs:			
TOU	190.4	0.0	190.4
CPP	186.6	0.0	186.6
PCT	1,126.8	0.0	1,126.8
PTR	647.2	0.0	647.2
Conservation Effect	636.3	0.0	636.3
TDBU Deferred Capital	0.0	221.5	221.5
Totals	2,787.3	221.5	3,008.8

c) Demand Response Benefit Drivers

There are numerous regulatory and business case drivers for Demand Response benefits, including the number of customers who will adopt TOU or CPP; the dollar value of avoided energy and capacity purchases; the applicability of AB 1X to default time-differentiated rates; the amount of energy customers conserve monthly or annually due to AMI enabled information about their usage and costs; and the level of responsiveness (or peak demand reduction) from customers who adopt time-differentiated rates.

There are also benefits related to sub-transmission and distribution related capital deferral resulting from all demand response tariffs and programs (noted as TDBU Deferred Capital in Table III-15). Capital deferral of upgrades to existing distribution facilities provides a significant cash flow benefit to SCE. SCE assumed that 20 percent reduction in projected megawatt (MW) growth in

1 peak demand could potentially result from Edison SmartConnect™ enabled demand response
2 capabilities. The deferred capital is based on a 10-year average of estimated sub-transmission and
3 distribution capital costs of approximately \$412,000 per MW. Exhibit SCE-4 details the expected MW
4 reduction as a result of Edison SmartConnect™ along with the related assumptions and drivers.

5 Starting in the Deployment Period, SCE assumes that it will offer the dynamic
6 rates and demand response programs discussed in detail in Exhibit SCE-4. The demand response
7 benefits are highly dependent on the specific terms and conditions of the tariffs, so the primary
8 regulatory driver of Demand Response benefits is the degree to which the approved tariffs match those
9 proposed in the full deployment application.

10 SCE uses the results from the Statewide Pricing Pilot (SPP) to determine both the
11 level of customer adoption of time-differentiated rates, as well as the degree of price-responsiveness of
12 those customers who adopt the rates.¹⁹ The SPP experiment was conducted over a two-year period and
13 may not represent the full effect of long term availability of pricing information and time-differentiated
14 tariffs. For example, academic literature on price elasticity of demand demonstrate that price elasticity
15 and energy conservation from time-differentiated tariffs are generally higher over the long term than in
16 the short run. Over the long term, customers make investments in their building structures (*e.g.*, energy-
17 efficient windows and better insulation) as well as lighting equipment and appliances commensurate
18 with their exposure to peak period pricing. Although the load impacts of dynamic pricing in the long
19 term should be higher than in the short run, SCE has not included the benefits from this effect at this
20 time.

21 SCE's approach to achieving significant demand response relies on the Peak Time
22 Rebate, pay for performance program, direct load control programs for residential customers, and TOU
23 and (CPP) rates for residential and commercial and industrial (C&I) customers.

¹⁹ 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.

1 d) Demand Response Benefit Assumptions

2 The Commission and CEC believe that a goal of price-responsive demand of 5
3 percent of system peak is achievable. With Edison SmartConnect™ this goal can be realized as well as
4 additional demand response from load control. A recent study by the Brattle Group for the CEC found
5 that the technical potential for demand response in California is nearly 25 percent of system peak.²⁰ The
6 study also found that the market potential for demand response in California is about 12 percent. SCE's
7 proposed demand response approach would achieve demand response of approximately 8 percent, two-
8 thirds of the full market potential by 2013. It is SCE's view that to achieve the market potential for
9 demand response, a portfolio of offerings including dynamic pricing and incentive-based load control is
10 required. Edison SmartConnect™ enables new approaches to both by evaluating the availability of load
11 reductions from operating air conditioning as well as by enabling a pay for performance approach to
12 incentives.

13 SCE proposes that significant demand reduction can be achieved with a Peak
14 Time Rebate (PTR) approach where the customer receives a rebate for reducing usage during the peak
15 time of a critical day. Studies for the City of Anaheim and for San Diego Gas and Electric found that
16 PTR could achieve results similar to Critical Peak Pricing (CPP) observed in the Statewide Pricing Pilot
17 (SPP).²¹ PTR could be offered to all customers, a significant advantage over dynamic pricing rates
18 which require rate structures and enrollment approaches compliant with AB1-X. AB1-X substantially
19 reduces the potential for dynamic pricing by excluding a substantial portion of customer usage from rate
20 changes.

21 SCE also proposes to improve on its successful track record with air conditioning
22 load control by offering a smart communicating thermostat based program that would provide two-way
23 communications to enable existing load availability and easy customer event override. The SCE smart

²⁰ CEC draft report, California's Next Generation of Load Management Standards, Ahmad Faruqui and Ryan Hledlik, May 2007, CEC-200-2007-007-D.

²¹ See A.05-03-015, Errata to Chapter 6, Demand Response Benefits, July 14, 2006 Amendment, by Dr. Stephen S. George on behalf of SDG&E, and Residential Customer Response to Real-Time Pricing: The Anaheim Critical-Peak Pricing Experiment, Frank Wolak, Center for the Study of Energy Markets (CSEM), May 2006.

1 thermostat program²² would supplement the existing load control switches already installed at the time
2 of smart meter deployment. The SCE smart thermostat program will require the use of Title 24
3 compliant programmable communicating thermostats PCTs.

4 SCE would move Commercial and Industrial (C&I) customers above 20kW to
5 Time of Use (TOU) dynamic pricing on a default basis with voluntary opt in to CPP rates. The SPP
6 found that C&I greater than 20kW can provide significant demand response.

7 SCE believes that customers can dramatically change peak usage behavior if
8 given the proper pricing signals, incentives, enabling technologies and tariffs and programs that make it
9 easy to do so. SCE has largely relied on assumptions and methodologies adopted in the AMI
10 applications by PG&E and SDG&E as well as applicable literature. SCE has not attempted to include
11 all potential demand response benefits leaving some room for potential increases, as noted in the
12 assumptions below:

13 The overarching assumptions in the analysis of Demand Response benefits
14 include:

15 (1) Meters and Communications

- 16 ○ All customers below 200kW will be equipped with Edison
17 SmartConnect™ meters per the deployment schedule.
- 18 ○ Residential meters will provide at least hourly interval data, collected
19 each day and available for customer viewing next day. Commercial
20 and industrial customer meters will provide 15 minute interval data.
- 21 ○ Two-way communications with the meter and any associated PCTs
22 will be enabled.

²² SCE's smart thermostat program may either involve rebates to customers who choose the thermostat to purchase through retailers or SCE providing thermostats to customers to facilitate the process. In either event, SCE will not own the thermostat.

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(2) Tariff Enrollment Assumptions

- Customer enrollments were estimated using the Momentum Market Intelligence model developed in the Statewide Pricing Pilot program. The model uses bill impact assessments to determine enrollment preferences.
- All residential customers will be eligible to receive Peak Time Rebates (PTR) for qualifying load reductions on critical days. The average residential customer awareness rate for PTR critical day events is assumed to be 50 percent. For example, for any given PTR critical event day, 50 percent of all residential customers will be aware that rebates for load reductions are available for that day.
- C&I customers above 20kW in demand will be defaulted to a TOU rate with the option to choose a CPP-F rate. The default TOU participation rate was estimated to be 51 percent for medium C&I customers.
- Some C&I customers above 20kW in demand will voluntarily enroll in CPP-F rates when they receive a SmartConnect™ meter. The opt-in CPP participation was estimated to be 25% of all medium C&I customers.

(3) Load Control Program Assumptions

- Title 24 compliant PCTs will be available and installed in new homes and HVAC retrofits requiring permits beginning in 2009.
- SCE will offer and market a load control program to customers based on Title 24 compliant PCTs that interface with Edison

1 SmartConnect™ meters and 25 percent are assumed to enroll.

2 Customers will be paid an incentive to participate.

3 ○ SCE will discontinue growth of the current Air Conditioning Cycling
4 Program (or Summer Discount Plan (SDP)) in 2009 which is expected
5 to have over 300,000 enrollees by then. The SDP program will
6 continue with moderate attrition. Beginning in 2009, the SDP program
7 will be changed for customers equipped with Edison SmartConnect™
8 meters. The program will be economically dispatched more often for
9 shorter durations to shave the system peak rather than only dispatched
10 for reliability purposes.

11 ○ An SCE smart thermostat program (using Title 24 compliant PCTs)
12 will be offered, beginning in 2009, to residential customers who have
13 Edison SmartConnect™ meters and existing central air conditioning
14 but are not required to have Title 24 compliant PCT installations. A
15 marketing program will initially enroll 60,000 customers per year until
16 approximately 250,000 customers are enrolled. Enrollment at 250,000
17 will be maintained. SCE will provide eligible customers equipment
18 and installation rebates up to \$125 per central air conditioner.
19 Customers will also be paid an incentive to participate in load control
20 events.

21 ○ Total SCE residential enrollment in load control will reach
22 approximately 25 percent of customers with central air conditioning.

23 ○ The present analysis is conservative in that it does not include load
24 control programs for C&I customers.

1 (4) Load Reduction Impacts

- 2 ○ SPP results for price elasticity and the Charles River Associates
3 PRISM model are used to determine load reductions for SCE’s
4 customers.²³
- 5 ○ No increase in prices elasticity for long term effects is included at this
6 time as the SPP did not address long-term elasticity.
- 7 ○ An energy conservation effect is included due to mass implementation
8 of dynamic rates and the widespread availability of pricing and other
9 information to customers about their energy usage and costs.

10 (5) Energy Information Assumptions

- 11 ○ Customers receiving price signals from tariffs and load control
12 programs will be much more aware of their usage and costs, by
13 various means. That awareness could result in significant energy
14 conservation.
- 15 ○ Studies have shown the energy conservation effect of price and usage
16 information from advanced metering could be as much as 20 percent.²⁴
17 SCE has assumed the conservation effect to be 1 percent of total
18 consumption per year.

19 (6) Procurement Benefit Assumptions

- 20 ○ SCE’s forecast for avoided capacity and energy costs is included. The
21 forecast relies on a Combustion Turbine (CT) proxy. The capacity

²³ Impact Evaluation of the California Statewide Pricing Pilot, Final Report, March 16, 2005, prepared by Charles River Associates.

²⁴ See PUBLIC UTILITIES FORTNIGHTLY MARCH 2007 at p. 42, citing *Direct Energy Feedback Technology Assessment for Southern California Edison Company*, prepared by Lynn Fryer Stein and Nadav Enbar, EPRI Solutions, March 2006 (noting that there is a risk of self-selection bias toward those more interested in conservation.) See also Ontario Energy Board Smart Price Pilot, Final Report July 2007, p. 7, estimating energy conservation to be at 6%.

1 value for CPP and load control is discounted due to their limited
2 availability compared to a CT.

- 3 ○ Includes avoided reserves and distribution losses.

4 (7) Transmission and Distribution Capital Deferral Assumptions

- 5 ○ The Transmission and Distribution assumptions include a benefit from
6 the deferral of capital expenditures for transmission and distribution
7 due to reduction in local system peak demand from Edison
8 SmartConnect™ tariffs and programs.

9 (8) Demand Response Benefits

10 Include:

- 11 ○ The avoided energy and capacity procurement (or construction) costs
12 that would otherwise be required to serve peak load in the absence of
13 Edison SmartConnect™-enabled load control and time-differentiated
14 rates.
- 15 ○ The avoided distribution capital costs associated with system upgrades
16 otherwise required to serve peak load in the absence of Edison
17 SmartConnect™-enabled load control and time-differentiated rates.

1 IV.

2 **SOCIETAL BENEFITS (NON-FINANCIAL)**

3 SCE has identified a number of non-tangible, societal benefits of Edison SmartConnect™
4 that are important in considering the reasonableness of Edison SmartConnect™. These benefits
5 include improvements in customer satisfaction reductions in energy theft, potential
6 environmental benefits, and other societal benefits that create positive externalities. There may
7 be societal benefits in the customer service improvements SCE expects from the Edison
8 SmartConnect™'s ability to mitigate customer exposure to service interruptions, outage
9 durations, and/or service degradation due to poor power quality. Potential societal costs include
10 the value of lost service by customers who provide demand reductions in response to
11 emergencies or price signals.

12 Because the societal benefits and costs are not quantifiable, or do not directly impact
13 SCE's revenue requirement, they are not included in the financial assessment. Over time,
14 however, SCE expects substantial benefits will be gained by the implementation of Edison
15 SmartConnect™ beyond what the numbers show.

16 In the recent SDG&E Decision, the Commission stated, "These various benefits (and
17 potentially others) are real, even if not quantified."²⁵ Appropriately, SCE describes some of
18 these societal benefits separately below.

19 **A. Improvement in Customer Experience**

20 Edison SmartConnect™ is likely to improve customer experience in numerous ways.
21 SCE has conducted primary and secondary research on its customers to better understand the
22 nature of the experience they have with SCE. Additionally, SCE has been examining the
23 consumer socio-economic and demographic trends in Southern California with a view to 2012.
24 The initial results of these analyses indicate that about 69% of SCE's customers today expect
25 more personalized service options and simple automated choices. The expected rise in

²⁵ D.07-04-043, p. 71.

1 customers with fixed incomes due to increasing population of retirement age along with as many
2 as one million immigrants coming to Southern California by 2012 creates new demands for how
3 SCE engages customers and provides services. The heightened awareness of environmental
4 concerns creates the opportunity for customer engagement on energy conservation and demand
5 response beyond the programs identified in this case. Customer feedback regarding the
6 capabilities of Edison SmartConnect™ in focus groups conducted over the past year was that
7 they see the opportunity to be the “smart” in Edison SmartConnect™.

8 **B. Energy Theft**

9 Energy theft occurs and is a cost of doing business that is borne by all ratepayers. Any
10 reduction in energy theft from the implementation of automated meters will enable SCE to
11 spread its revenue requirement over more energy sales, thus reducing rates. SCE anticipates that
12 Edison SmartConnect™ will reduce energy theft in three ways. First, during deployment, SCE’s
13 vendor will be removing every existing meter and replacing it with a new solid-state meter and
14 the installers (both SCE and contracted labor) will be trained to notice irregularities which can be
15 investigated as potential theft. Second, the tamper detection capability of the Edison
16 SmartConnect™ meter will virtually eliminate meter tampering as a source of energy theft as the
17 meter will provide tamper notification which will be analyzed and potentially investigated for
18 theft. Third, the more sophisticated Meter Data Management System is expected to allow SCE
19 to better detect bypass and partial-bypass theft through data mining.

20 Any reduction in energy theft essentially reduces cross subsidization and insures that
21 costs are billed appropriately to those utilizing the energy.

22 **C. Environmental Benefits**

23 There are potential environmental improvements that will result from reduced generation
24 and from substituting more-efficient off-peak generators for less-efficient on-peak units through
25 the use of demand response and load control. Energy conservation, based on Edison
26 SmartConnect™ information, has a very large potential for creating significant environmental
27 benefits. Based on conservative estimates in this case, SCE expects Edison SmartConnect™ to

1 create an annual reduction of 365,000 metric tons of carbon dioxide or about 1,000 metric tons
2 per day.²⁶

3 **D. Non Qualified Benefits from SmartConnect™ Functionality**

4 Edison SmartConnect™ system has several capabilities that provide real options for
5 future value that are not quantifiable today. For example, the meter has the ability to measure
6 voltage at the premise and may be used for a variety of purposes, such as to support improved
7 customer service, contribute to grid asset management and to provide feedback to customer side
8 energy management systems. Additionally, the integrated service switch has remote load
9 limiting capability that can be used for managing peak demand at the premise level to mitigate
10 grid emergencies and provide a demand subscription rate option. The switch also opens on a
11 power failure and can detect voltage on the customer side of the switch when open that provides
12 a safety feature in the event the customer turns on a generator on their side of the meter after a
13 power outage. This same switch can contain a randomizer to stagger the closure of the switches
14 in an area to reduce the surge when a circuit is re-energized. These capabilities and other
15 foundational aspects of the system continue to be explored by SCE and may become fully
16 functional in Release 3 or beyond.

17 **E. Improved Customer Security**

18 Edison SmartConnect™ will improve customer security because meter readers will no
19 longer have to physically read customers' meters by entering yards, or in more limited cases,
20 customers' homes. In focus groups, customers identified safety and security as compelling
21 benefits of Edison SmartConnect™. For example, some customers cited the need to put their
22 dogs inside on meter reading days as a security issue because the dogs are kept as a theft
23 deterrent. Additionally, other customers referred to the need to unlock doors or gates to allow

²⁶ The energy procurement benefits of the demand response and conservation impacts of SmartConnect are detailed in Exhibit SCE-4, but SCE's business case does not include benefits for carbon dioxide reductions of approximately 365,000 metric tons per year due to reduced electrical generation.

1 meter reading as a security issue that will no longer exist. In all automating the meter reading
2 process was seen as a significant safety and security benefit from a customer perspective.

V.

ANALYSIS OF SMARTCONNECT™ REVENUE REQUIREMENT AND RATEPAYER IMPACTS

This section describes the SmartConnect™ cost-effectiveness analysis performed by SCE that compares ratepayers’ benefits from implementation of SmartConnect™ to the project costs resulting from implementation of SmartConnect™. The benefits of SmartConnect™ are the costs that ratepayers avoid as a result of SmartConnect™. Specifically, this avoided cost is the difference between what ratepayers would pay for service assuming SmartConnect™ is fully implemented, and what they would pay assuming no implementation through 2032.

The following equation sets forth the benefit-to-cost ratio for SmartConnect™:

$$\text{Benefit-to-Cost Ratio} = \frac{\text{PV of Ratepayer Benefits}}{\text{PV of Ratepayer Costs}}$$

The 2007 present value of the revenue requirement (PVRR) of Ratepayer Benefits for SmartConnect™ was calculated at \$1,736 million. The 2007 PVRR of deployment costs was calculated at \$1,627 million. The resulting benefit-to-cost ratio is 1.07 to 1. SCE found that ratepayer benefits exceed costs by \$109 million.

A. Methodology

SCE’s cost-effectiveness evaluation of SmartConnect™ is a life-cycle benefit-to-cost analysis from a ratepayer perspective. SCE’s life-cycle perspective measures total benefits and costs from 2007-2032. Because benefits and costs occur over many years, SCE used net present value (NPV) analysis to bring all benefits and costs to the base year of 2007. Measuring benefits and costs from a ratepayer perspective means that SCE valued all benefits and costs using the revenue requirement that ratepayers would incur or avoid.

1. Benefit-To-Cost Analysis

NPV is the discounted monetized value of expected net benefits (*i.e.*, benefits minus costs). NPV assigns monetary values to benefits and costs, discounts future benefits and

1 costs using an appropriate discount rate, and subtracts the sum total of discounted costs from the
2 sum total of discounted benefits. Discounting benefits and costs transforms gains and losses
3 occurring in different time periods to a common unit of measurement. The ratio of the NPV of
4 benefits to the NPV of costs is the benefit-to-cost ratio. Values above 1.0 indicate projects which
5 benefit ratepayers.

6 In this analysis, the benefits of SmartConnect™ are the difference between
7 avoided costs from SmartConnect™ and the Post Deployment costs (post 2012) ratepayers
8 would incur from SmartConnect™ implementation. Table V-16 shows the PVRR for ratepayer
9 net benefits.

10 **2. Revenue Requirement Model**

11 a) Purpose of the Revenue Requirement Model

12 To quantify ratepayers' benefits resulting from SmartConnect™, it is
13 necessary to determine the avoided and incremental costs that ratepayers will incur from 2007-
14 2032 due to SmartConnect™ Implementation. To do this, SCE converts the avoided and
15 incremental costs into the ratepayers' revenue requirement.

16 To quantify ratepayers' SmartConnect™ project costs (2007-2012
17 deployment costs²⁷), it is necessary to determine the annual payments equivalent to the
18 SmartConnect™ deployment costs. Therefore, SCE also converts the deployment costs into a
19 revenue requirement.

20 Because ratepayers pay revenue requirements over a number of years, to
21 compare different revenue requirements, it is necessary to put them on a consistent basis relative
22 to the timing of payments. This conversion to a consistent basis is called Present Value (PV)
23 analysis. For the SmartConnect™ benefit-to-cost analysis, SCE converted each revenue

²⁷ Deployment costs include pre-deployment costs.

1 requirement into a single PV that assumes 2007 as the base year.²⁸ Therefore, the purpose of the
 2 revenue requirement model is two-fold. First, the model converts SCE’s costs (either avoided or
 3 expected) into a revenue requirement which ratepayers would expect to pay. Second, the model
 4 changes these streams of revenue requirements paid over a number of years into a single PV.

5 Table V-16 lists the PV of ratepayers’ benefit due to the AMI.

Table V-16
Ratepayer PVRR of Benefits
Resulting from SmartConnect™ Implementation
(\$ In Millions, Rounded)

Ratepayer Avoided Costs from SmartConnect™ Implementation	
Capital Savings	\$334
O&M Savings	\$1,036
Demand Response Savings	\$706
Total: Ratepayer Avoided Costs from SmartConnect™ Implementation	\$2,076
Post Deployment Costs from SmartConnect™ Implementation	
Incremental Capital	\$123
Incremental O&M	\$217
Total: Post Deployment Costs	\$340
Ratepayer benefit	\$1,736

6 **b) Overview of Revenue Requirement Model**

7 As described above, SCE used the revenue requirement model to:

- 8 (1) convert costs incurred by the utility into a revenue requirement paid by ratepayers; and
 9 (2) translate the revenue requirement into a PV for comparison purposes. The testimony below
 10 describes the methodology for each of these tasks.

11 **(1) Conversion of Costs Into a Revenue Requirement**

12 A utility’s cost of service, or revenue requirement, is all of its
 13 operating expenses plus a return on its investment. Therefore, the revenue requirement equals
 14 the sum of all costs necessary to meet its obligation to serve. The following formula expresses
 15 this revenue requirement:

²⁸ Present value calculated using SCE’s 10% incremental cost of capital. If SCE were to use its 2007 authorized cost of capital as a discount rate instead of its incremental cost of capital (similar approach of SDG&E), SCE’s net benefits of Edison SmartConnect™ would increase to \$241 million.

1 Revenue requirement = Operation and Maintenance (O&M) expense +
2 Depreciation expense +
3 Tax expense +
4 Return on investment

5 O&M expense is the cost of routine work that SCE performs to
6 supply electric service during the course of a year. O&M expenses include labor, materials,
7 supplies, and variable administrative and general (A&G) expenses.

8 Depreciation expense is the charge against earnings that SCE takes
9 each year to allow for the recovery of an investment (including removal costs) over its useful
10 life.

11 Tax expense includes taxes based on income, miscellaneous taxes,
12 and Ad Valorem (property) taxes on incremental investment.

13 Return is the cost of capital SCE incurs to finance its long-term
14 investments. SCE multiplies the rate of return by its long-term investment to calculate its return.
15 For the SmartConnect™ benefit-to-cost analysis, SCE used its incremental cost of capital.
16 SCE's long-term investment is its Rate Base. The following formula illustrates the calculation of
17 Rate Base:

$$18 \text{ Rate Base} = \text{Fixed capital} - \text{Reserves}$$

19 Fixed capital is the sum of the plant in service, intangible plant
20 including capitalized software, and plant held for future use. Reserves include accumulated
21 depreciation, accumulated amortization, and accumulated deferred taxes.

22 (2) [Translate the Revenue Requirement into a Present Value](#)

23 As previously discussed, once SCE has calculated the revenue
24 requirements for each cost component, it is necessary to put them on a consistent basis relative to
25 the timing of the ratepayers' payment. Table V-17 lists the annual revenue requirements for each
26 of the cost components used in the benefit-to-cost analysis. Section b1 above, describes the
27 calculation of these revenue requirements. Table V-18 below compares the sum of each revenue
28 requirement to the PV of each revenue requirement.

Table V-17
Summary of SmartConnect™ Revenue Requirement
(\$ In Millions, Rounded)

SMARTCONNECT Revenue Requirement Summary Table													
	POST DEPLOYMENT COSTS					AVOIDED COSTS					Ratepayer Benefits	Deployment Cost	Net Benefit
	CAPITAL	O&M	Total Costs	O&M Savings	Capital Savings	Demand Response	Total Avoided Costs	Ratepayer Benefits	Deployment Cost	Net Benefit			
2007	-	-	-	-	-	-	-	-	-	-	-	27,251	(27,251)
2008	-	-	-	1,219	-	1,219	-	-	-	-	1,219	69,374	(68,154)
2009	-	-	-	8,254	-	8,254	2,636	-	4,487	-	15,378	154,438	(139,060)
2010	-	-	-	29,265	-	29,265	7,298	-	26,889	-	63,453	241,915	(178,462)
2011	-	-	-	61,353	-	61,353	12,555	-	48,004	-	121,912	293,246	(171,334)
2012	-	-	-	90,228	-	90,228	20,512	-	66,497	-	177,237	322,412	(145,175)
2013	2,989	57,766	60,755	118,134	35,755	177,944	77,944	231,833	77,944	171,078	171,078	234,464	(63,386)
2014	7,548	48,345	55,892	125,606	45,378	179,944	84,703	255,687	84,703	199,795	199,795	215,834	(16,039)
2015	11,468	40,440	51,908	132,192	50,636	186,327	90,442	273,270	90,442	221,362	221,362	202,153	19,209
2016	15,612	32,803	48,415	139,772	52,663	198,891	93,891	286,327	93,891	237,911	237,911	190,917	46,994
2017	18,638	33,950	52,588	148,230	56,014	204,244	98,874	303,118	98,874	250,530	250,530	180,832	69,698
2018	20,643	32,844	53,487	155,959	56,512	212,471	104,027	316,499	104,027	263,011	263,011	171,423	91,588
2019	21,931	33,747	55,678	164,528	57,647	222,175	109,798	331,973	109,798	276,295	276,295	162,087	114,208
2020	24,167	35,529	59,696	172,980	58,891	231,871	114,687	346,558	114,687	286,862	286,862	152,725	134,137
2021	25,857	36,238	62,094	182,156	60,186	242,342	120,539	362,881	120,539	300,787	300,787	143,330	157,457
2022	27,980	37,331	65,311	190,410	61,798	252,208	126,584	378,791	126,584	313,480	313,480	133,908	179,572
2023	30,065	38,753	68,818	199,238	64,271	263,509	132,807	396,316	132,807	327,498	327,498	124,461	203,037
2024	33,550	38,583	72,133	208,160	65,841	274,001	139,229	413,230	139,229	341,097	341,097	115,045	226,053
2025	36,051	40,106	76,156	217,666	67,552	285,218	145,808	431,026	145,808	354,870	354,870	105,714	249,156
2026	37,561	42,146	79,707	227,850	69,500	297,350	152,635	449,984	152,635	370,276	370,276	96,475	273,801
2027	38,710	44,021	82,731	238,181	72,055	310,236	159,696	469,931	159,696	387,201	387,201	87,326	299,875
2028	41,788	44,165	85,953	248,568	76,058	324,626	166,953	491,578	166,953	405,626	405,626	75,016	330,610
2029	45,919	45,257	91,176	260,193	78,186	338,382	175,476	513,855	175,476	422,679	422,679	48,872	373,807
2030	53,008	46,018	99,026	271,729	82,425	354,153	183,173	537,328	183,173	438,302	438,302	21,781	416,521
2031	68,056	47,739	115,795	284,089	90,395	374,484	192,291	566,775	192,291	450,980	450,980	(29,599)	480,580
2032	90,465	50,183	140,649	295,726	94,930	390,656	200,493	591,148	200,493	450,500	450,500	(992)	451,492
Total	652,004	825,964	1,477,968	4,171,688	1,339,692	5,511,380	2,815,927	8,327,307	2,815,927	6,849,339	6,849,339	3,540,407	3,308,932
2007 PV	123,453	217,149	340,602	1,036,067	334,089	1,370,156	706,165	2,076,321	706,165	1,735,719	1,735,719	1,627,024	108,695

Table V-18
Revenue Requirement Resulting from SmartConnect™ Implementation
(\$In Millions, Rounded)

	Sum of Annual Revenue Requirement	PVRR
Ratepayer Avoided Costs from SmartConnect™ Implementation		
Capital Savings	\$1,340	\$334
O&M Savings	\$4,172	\$1,036
Demand Response	<u>\$2,816</u>	<u>\$706</u>
Total: Ratepayer Avoided Costs from SmartConnect™ Implementation	\$8,327	\$2,076
Post Deployment Costs from SmartConnect™ Implementation		
Incremental Capital	\$652	\$123
Incremental O&M	<u>\$826</u>	<u>\$217</u>
Total: Post Deployment Costs	\$1,478	\$340
Ratepayer Benefit	\$6,849	\$1,736
SmartConnect™ Deployment Costs	\$3,540	\$1,627
Net PVRR		\$109

The difference between the sum of the annual revenue requirements and the PV of the revenue requirements is due to the timing of the ratepayers' payments. The earlier the ratepayer pays the revenue requirement, the higher the PV. The following formula translates the revenue requirement into the PV:

$$PV = \frac{RR_1}{(1+r)} + \frac{RR_2}{(1+r)^2} + \dots + \frac{RR_n}{(1+r)^n} = \sum \frac{RR_i}{(1+r)^i}$$

where:

RR - represents the revenue requirement costs.

i - Represents the year in which ratepayers pay the revenue requirement.

n - Represents the year considered.

r - Represents the discount rate (the discount rate quantifies the willingness of ratepayers to exchange present costs and benefit for future costs and benefits).

1 **B. Benefit-To-Cost Ratio Results**

2 Figure V-1 below shows how SCE calculates the benefit-to-cost ratio for SmartConnect™ in three
3 representations of the same equation. Each representation of the equation provides more details of the data
4 utilized in the calculation. Equation No. 1, shows at the most summary level the benefit-to-cost ratio,
5 comparing ratepayer benefits to ratepayer costs. Equation No. 2, in Figure III-2, shows how the ratepayer
6 benefits are calculated by subtracting the Present Value Revenue Requirement (PVRR) of incremental
7 operating costs from avoided costs. The result of that equation is then divided by the PVRR of
8 SmartConnect™ project costs.

9 Equation No. 3 in Figure V-1 delves even more deeply into the details of determining the PVRR for
10 avoided and incremental costs. Equation No. 3 shows that the PVRR of avoided costs are equivalent to the
11 PVRR of capital savings, O&M savings, and demand response savings. From this PVRR SCE subtracts the
12 PVRR of incremental operating costs. The PVRR of incremental operating costs is the PVRR of
13 incremental capital plus the PVRR of incremental O&M. This PVRR of ratepayer benefits is then divided
14 by the PVRR of SmartConnect™ project costs.

***Figure V-1
Detailed Benefit-To-Cost Framework***

1.	Benefit-To-Cost =	$\frac{\text{PV of Ratepayer Benefits}}{\text{PV of Ratepayer Costs}}$
2.	Benefit-To-Cost =	$\frac{\text{PVRR of Avoided Costs} - \text{PVRR of Post Deployment Costs}}{\text{PVRR of Deployment Costs}}$
3.	Benefit-To-Cost =	$\frac{\text{PVRR of (Capital Savings + O\&M Savings + Demand Response)} - \text{LESS PVRR of (Post Deployment Capital + O\&M)}}{\text{PVRR of Deployment Costs}}$

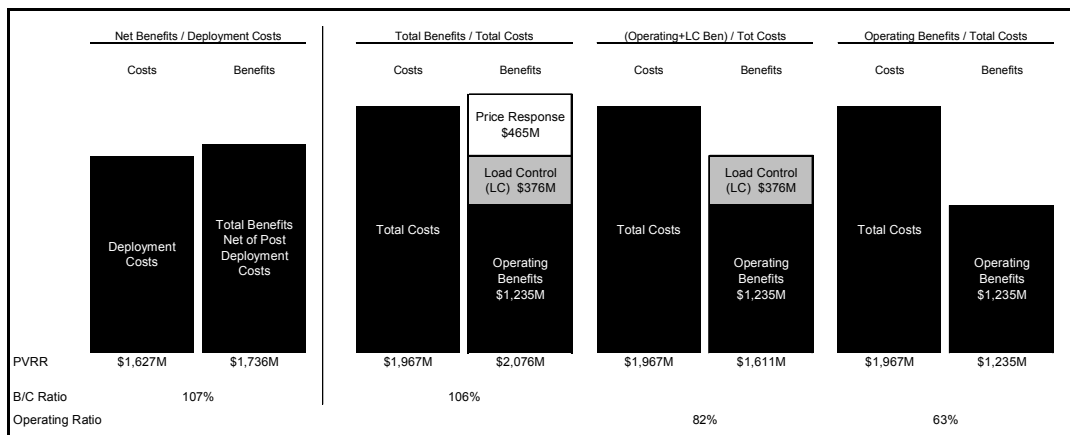
15 Table V-19 shows the results of SCE's benefit-to-cost calculation.

Table V-19
Benefit-To-Cost Calculation
(\$In Millions, Rounded)

Ratepayer Avoided Costs from SmartConnect™ Implementation	\$2,076
Post Deployment Costs from SmartConnect™ Implementation	\$340
Ratepayer Benefits	\$1,736
Ratepayer Deployment Costs	\$1,627
Benefit-To-Cost Ratio	1.07
Net Benefit	\$109

1 SCE has also calculated the ratio of total benefits to total costs, as well as the ratio of total
2 operational benefits, reflecting no demand response benefits to total project costs. After removing the
3 easily-identified incremental costs of operating and promoting demand response programs; this approach
4 produces a ratio of 63 percent. The analysis of operational plus direct load control benefits to respective
5 cost results in a ratio of 82 percent. SCE submits that the best measure of benefit to cost ratio should
6 include all customer demand response benefits made up of both direct load control benefits and the longer
7 term and very real price response benefits expected to result from dynamic pricing; this results in a benefit
8 to cost ratio of 106%. Each of these benefit-to-cost ratios is illustrated in Figure V-2.

Figure V-2
Comparison of 2007 PVRr Benefit-to-Cost Ratios for Edison
SmartConnect™ Project
(Millions of 2007 Dollars)



Appendix A
Witness Qualifications

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF LISA D. CAGNOLATTI**

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

5 A. My name is Lisa D. Cagnolatti, and my business address is 2244 Walnut Grove Avenue,
6 Rosemead, California 91770.

7 Q. Briefly describe your present responsibilities at the Southern California Edison Company.

8 A. I am the Director of the Customer Communications Organization

9 Q. Briefly describe your educational and professional background.

10 A. I hold a Bachelor's degree in Chemical Engineering from UCLA and an MBA from
11 Pepperdine University. I have over 20 years of experience in the utility industry
12 including positions of increasing responsibility in Marketing, Environmental Affairs,
13 Regulatory Affairs, Transmission and Distribution, and Customer Services.

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

15 A. The purpose of my testimony in this proceeding is to sponsor the portions of this Exhibit
16 SCE-3 as identified in the Table of Contents herein.

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

18 A. Yes, it was.

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

20 A. Yes, I do.

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

23 A. Yes, it does.

24 Q. Does this conclude your qualifications and prepared testimony?

25 A. Yes, it does.

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF BERRY L. CURRY**

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

5 A. My name is Berry L. Curry, and my business address is 2244 Walnut Grove Avenue,
6 Rosemead, California 91770.

7 Q. Briefly describe your present responsibilities at the Southern California Edison Company.

8 A. I work in the Distribution Engineering group. Our primary responsibilities include the
9 creation and publication of SCE's Distribution Substation Plan, which documents the
10 projected distribution and subtransmission system load forecast, load growth and capital
11 investment required to meet the load growth.

12 Q. Briefly describe your educational and professional background.

13 A. Bachelor of Science in Electrical Engineering, New Mexico State University, 1987.
14 Registered Professional Engineer, State of California, E13856. I have worked in the
15 electric utility industry continuously since 1987.

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

17 A. The purpose of my testimony in this proceeding is to sponsor the portions of this Exhibit
18 SCE-3 as identified in the Table of Contents herein.

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

20 A. Yes, it was.

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

22 A. Yes, I do.

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

25 A. Yes, it does.

26 Q. Does this conclude your qualifications and prepared testimony?

27 A. Yes, it does.

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF PAUL J. DE MARTINI**

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

5 **A. My name is Paul J. De Martini, and my business address is 2244 Walnut Grove Avenue,**
6 **Rosemead, California 91770.**

7 **Q. Briefly describe your present responsibilities at the Southern California Edison Company.**

8 **A. I am the Edison SmartConnect Program Director. I am responsible for managing all**
9 **aspects of the AMI program feasibility, system design, development, and deployment**
10 **efforts.**

11 **Q. Briefly describe your educational and professional background.**

12 **A. I hold a Master of Business Administration (M.B.A) degree from the University of**
13 **Southern California and a Bachelor of Science (B.S.) degree in Applied Economics from**
14 **the University of San Francisco. I also completed Certificates in Project Management**
15 **from the University of California, Berkeley and Technology Management from the**
16 **California Institute of Technology. I have been at Southern California Edison for about**
17 **five years during which I was the IT Project Manager on AMI beginning in 2004, prior to**
18 **assuming the overall program management responsibility in 2005. Relevant positions**
19 **prior to joining Southern California Edison included Vice President of the Energy**
20 **Strategy practice at ICF International in 2000-2002 with a focus on demand response,**
21 **advanced metering and distributed generation technologies. I began my career at PG&E**
22 **Corporation in both regulated and unregulated businesses for nearly twenty years. I held**
23 **positions at the utility with increasing responsibility involving electric systems**
24 **operations, T&D project management, and wholesale power procurement and ultimately**
25 **at the unregulated subsidiary PG&E Energy Services as Vice President, Integrated**
26 **Services.**

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

1 A. The purpose of my testimony in this proceeding is to sponsor portions of this Exhibit
2 SCE-3 as identified in the Table of Contents herein.

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

4 A. Yes, it was.

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

6 A. Yes, I do.

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

9 A. Yes, it does.

10 Q. Does this conclude your qualifications and prepared testimony?

11 A. Yes, it does.

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF PAUL KEVIN ELLISON**

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

5 A. My name is Paul Kevin Ellison, and my business address is 2244 Walnut Grove Avenue,
6 Rosemead, California 91770.

7 **Q. Briefly describe your present responsibilities at the Southern California Edison Company.**

8 A. I serve as the Director of the Meter Services Organization in the Customer Service
9 Business Unit (CSBU). This is the senior leadership position in the organization. The
10 Meter Services Organization is responsible for all aspects of the end-to-end meter process
11 including:

- 12 • Evaluating and monitoring the business environment
- 13 • Planning, developing, and implementing meter process improvements
- 14 • Performing meter evaluations and laboratory testing
- 15 • Planning, testing and implementing new and efficient technologies
- 16 • Meter installation, change, maintenance, assessments and compliance
- 17 • Field customer service requests, including turn-ons and turn-offs
- 18 • Routine and non-routine meter reading
- 19 • Investigating unauthorized use and recovery of revenue loss
- 20 • Ensuring the accuracy and integrity of revenue billing

21 **Q. Briefly describe your educational and professional background.**

22 A. I hold a Bachelors Degree in Business Administration from the University of Louisville
23 and a Masters Degree in Business Administration from Bellarmine University in
24 Louisville, Kentucky. In addition, I have completed a number of Executive Education
25 programs. I have over 27 years of utility experience, the last three years with Southern
26 California Edison Company. Prior to joining the Southern California Edison Company, I
27 previously worked at LG&E Energy Corp (Louisville Gas and Electric Company and

1 Kentucky Utilities Company) where I held a number of senior management and
2 management positions in Customer Service, Marketing, T&D Operations and Economic
3 Development. From April 2001 until May 2004, I served as Chief Operating Officer for
4 a Louisville, KY based Software Company and with Merrill Lynch as a Financial
5 Advisor, focused on the small business marketplace. I began work for SCE in 2004 as
6 the Director of the Government and Institutions group within the Business Customer
7 Division. I have been in my current position as the Director of the Meter Services
8 Organization since March 2006.

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

10 A. The purpose of my testimony in this proceeding is to sponsor the portions of this Exhibit
11 SCE-3 as identified in the Table of Contents herein.

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

13 A. Yes, it was.

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

15 A. Yes, I do.

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

18 A. Yes, it does.

19 Q. Does this conclude your qualifications and prepared testimony?

20 A. Yes, it does.

21

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF ERIC S. HELM**

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

5 A. My name is Eric S. Helm, and my business address is 2244 Walnut Grove Avenue,
6 Rosemead, California 91770.

7 Q. Briefly describe your present responsibilities at the Southern California Edison Company.

8 A. As Manager of Financial Planning and Analysis for the Customer Service Business Unit,
9 I am currently responsible for financial modeling, project analysis, and product and
10 service pricing for major projects within the business unit.

11 Q. Briefly describe your educational and professional background.

12 A. I hold a Bachelor of Arts degree in Economics from Claremont McKenna College, and an
13 MBA with a Finance concentration from California State University at Long Beach. I
14 joined Edison's Residential Energy Management staff in 1983, working on residential
15 rebate and home energy survey programs. I held analyst positions in the Revenue
16 Requirements department from 1987-89, and analyst and management positions in SCE's
17 Treasurer's department from 1989-1996, primarily in the Investor Relations group. I
18 have managed the CSBU Financial Planning function since 1996. I have previously
19 testified before this Commission.

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

21 A. The purpose of my testimony in this proceeding is to sponsor the portions of this Exhibit
22 SCE-3 as identified in the Table of Contents herein.

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

24 A. Yes, it was.

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

26 A. Yes, I do.

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

3 A. Yes, it does.

4 Q. Does this conclude your qualifications and prepared testimony?

5 A. Yes, it does.

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

3 A. Yes, it does.

4 Q. Does this conclude your qualifications and prepared testimony?

5 A. Yes, it does.

1 **SOUTHERN CALIFORNIA EDISON COMPANY**
2 **QUALIFICATIONS AND PREPARED TESTIMONY**
3 **OF CHARLIE C. HU**

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

5 A. My name is Charlie Hu, and my business address is 2244 Walnut Grove Avenue,
6 Rosemead, California 91770.

7 Q. Briefly describe your present responsibilities at the Southern California Edison Company.

8 A. I am currently leading the Business Design effort for Edison SmartConnect™ Program at
9 Southern California Edison. In this role, I am accountable for all back office activities
10 needed to support Edison SmartConnect™. The back office activities include designing
11 and implementing the business processes and information technologies needed to support
12 Edison SmartConnect™. My direct and matrixed staffs include SCE project managers,
13 subject matter experts, external consultants, and vendors.

14 Q. Briefly describe your educational and professional background.

15 A. I hold a Bachelor of Science (B.S.) degree in Computer Science from California State
16 University of Los Angeles. I also completed the Management Program from Columbia
17 University Graduate School of Business and various graduate classes from Pepperdine
18 University. I have been in Southern California Edison for over seventeen years. I was in
19 the Information Technology organization the first seven years where I held positions with
20 increasing responsibility involving system development and implementation of our
21 current billing system. The last ten years include leadership roles involving
22 implementation of various major process improvement initiatives in the Customer
23 Service organization with focus in the areas of customer service, metering, meter reading,
24 field services, billing, and revenue collections.

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

26 A. The purpose of my testimony in this proceeding is to sponsor the portions of Exhibit
27 SCE-3, as identified in the Table of Contents herein.

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

2 A. Yes, it was.

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

4 A. Yes, I do.

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

7 A. Yes, it does.

8 Q. Does this conclude your qualifications and prepared testimony?

9 A. Yes, it does.

10

1 Q. Does this conclude your qualifications and prepared testimony?

2 A. Yes, it does.