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(U 338-E)

Testimony Supporting Application for Approval of Advanced Metering Infrastructure Deployment Strategy and Cost Recovery Mechanism

Volume 3 –Advanced Metering Infrastructure Business Case Analysis

Before the

Public Utilities Commission of the State of California

Rosemead, California

March 30, 2005

Advanced Metering Infrastructure Business Case Analysis

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I.

INTRODUCTION

The purpose of this volume is to describe our "best" full and partial Advanced Metering Infrastructure (AMI) deployment scenarios, as required by the Assigned Commissioner and Administrative Law Judge's Ruling issued on November 24, 2004. Although SCE does not recommend either of these scenarios, we describe them here based on the criteria and assumptions contained in Attachment A of the July 21, 2004 Ruling. The July 21, 2004 Ruling identified eight full deployment scenarios and eight partial deployment scenarios for the utilities to analyze. After conducting analysis of these scenarios, SCE found that Scenarios 7 and 21 were the "least-unfavorable" full and partial deployment scenarios, respectively. However, because both of these scenarios included the benefits of a proposed Advanced Load Control (ALC) program that could be implemented without AMI, SCE does not consider them true AMI cases. Therefore, from a purely AMI business case perspective, our "least-unfavorable" AMI business cases are Scenarios 4 and 17.[1] Both Scenarios 4 and 17 include operational and demand response benefits which are based on the assumption that all new AMI-metered customers would be offered the CPP-F or CPP-V rate on a default basis (*i.e.*, with an "opt-out" provision).

Section II of this volume summarizes the results of our "best case" full and partial deployment scenarios.

Section III provides an overview of the operational impacts expected from full and partial deployment.

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[1] As presented in this Application, Scenario 17's results show a less-negative net present value (NPV) than when that scenario was presented in our January 2005 compliance filing. This change reflects modification of the deployment strategy to include AMI meter installations only in the high density portions of Zone 4 in order to achieve a higher AMI communication success rate.

Sections IV and V provide detailed cost and benefit analyses for the "best case" full and partial deployment scenarios, respectively. The cost analyses are presented in terms of the July 21, 2004 Ruling's five applicable cost categories[2] and 79 individual cost codes associated with these cost categories. The benefit analyses are presented in terms of the four major benefit categories and the individual benefit codes that were actually used in this analysis.[3] These two sections also include discussion of the risks and uncertainties identified to date and present an NPV analysis, based on the costs and benefits identified, for the two "best case" scenarios. Lastly, these sections set forth the preliminary revenue requirement and impact on customer rates of the "best case" full and partial deployment scenarios.

[2] The July 21, 2004 Ruling specifies a sixth category for natural gas impacts. These costs are not applicable to SCE's business case analysis and thus, are not included.

[3] A summary discussion of all 40 benefit codes, whether used or not, is contained in Appendix H of Volume 4.

II.

SUMMARY OF RESULTS

As directed by the November 24, 2004 Ruling, the following sections describe our "best case" full deployment scenario and "best case" partial deployment scenario. In reviewing the business case analysis, we determined that the "best case" full and partial deployment scenarios involved a default CPP rate. These were presented as Scenarios 4 and 17 in our January 2005 compliance filing.

A summary of the revised costs and benefits on both a pre-tax cash flow and a revenue requirement NPV basis for each of the two "best case" scenarios is presented below in Table 3-1 below.

Table 3-1
Summary of Best Case Full and Partial AMI Deployment
(Costs and Benefits in Thousands of 2004 Present Value Dollars)

Scenario Description	Number of AMI Meters	Total Cost	Total Benefits	Pre-Tax Subtotal	After-Tax NPV	Rev. Req. NPV
Full Deployment (Scenario 4)	4.5 million	($1,298,413)	$804,648	($493,765)	($402,860)	($951,815)
Partial Deployment (Scenario 17)	325,000	($164,158)	$77,691	($86,467)	($60,880)	($129,901)

The July 21, 2004 Ruling's required analysis parameters included the assessment of uncertainty and risk in both a quantitative and qualitative manner.[4] The above summary includes the results of our Monte Carlo simulations of the cost parameters and the demand response benefit elements of both "best case" scenarios, which resulted in cost contingencies for the full and partial scenarios of $64.5 million and $7.5 million in 2004

[4] July 21, 2004 Ruling, pp. 12-13.

present value dollars, respectively. We believe a 90 percent confidence level is reasonable for this type of project and these amounts represent achieving this confidence level. A qualitative description of these risk parameters is included at the end of the business case for each scenario.

A. Summary of Costs and Benefits

Table 3-2 summarizes the total estimated costs and benefits we expect will result from deployment of AMI under Scenarios 4 and 17.

Table 3-2
Summary of Costs and Benefits
(2004 Pre-tax Present Value Dollars in Millions)

Line No.	Cost Benefit Category	Scenario 4	Scenario 17
1	Meter System & Inst. Costs	$668,399	$60,063
2	Communication System Costs	41,974	6,478
3	Information Technology Costs	206,003	45,475
4	Customer Services Costs	211,459	23,122
5	Management and Other Costs	170,578	29,021
6	**Cost Total**	**$1,298,413**	**$164,158**
7	Systems Operations Benefits	$307,333	$20,655
8	Customer Service Benefits	8,268	3,860
9	Management and Other Benefits	122,316	10,309
10	Demand Response Benefits	366,731	42,867
11	**Benefit Total**	**$804,648**	**$77,691**
12	**Pre-Tax Sub-Total**	**($493,765)**	**($86,467)**

Both of these scenarios assume that 80 percent of eligible customers are defaulted to CPP-F rates (residential) or CPP-V rates (commercial <200 kW)[5] and that those

[5] Customers with demands in excess of 200 kW are assumed to already have AMI type meters installed. Costs and benefits associated with implementing RTP rates are considered to be independent of this analysis (*see* the "Business as Usual" case in Appendix G of this filing, and Scenarios 12 and 13 in SCE's January compliance filing in this proceeding). The July 21, 2004 Ruling's required scenarios included moving customers over 200 kW to an RTP tariff. Rather than include large customers in Scenarios 4 and 17, we prepared separate business cases (Scenarios 12 and 13) to show the cost/benefit of this measure separately. These cases are summarized in Appendix I.

customers stay on those rates for the full duration of the business case. For analysis purposes, we assumed that the customers opting-out of the default rate would either switch back to their tiered rate or choose a time-of-use (TOU) rate in equal proportions. We have not adjusted the above demand response benefits for Value of Service Loss to customers due to participation in time-differentiated rates (TDRs).[6] For Scenarios 4 and 17, the Value of Service Loss is approximately $113 million and $6.2 million respectively (2004 present value dollars), reducing the total demand response benefit for each scenario by a similar amount.

B. Summary of NPV Analysis

Costs and benefits for each business case scenario were estimated by the appropriate operating organizations using current (2004) dollars for all non-labor costs, and job titles and estimated full time equivalent (FTE) employees for all SCE labor costs. All costs and benefits were estimated in 2004-dollars, escalated to the forecast year (2006-2021), and then discounted to 2004 present value[7] using SCE's long-term Weighted Average Cost of Capital (10.5 percent). Cost categories from the July 21, 2004 Ruling[8] were used to summarize planned expenditures, in nominal dollars, by category and year. Capital/expense, depreciation, and amortization analyses were performed for revenue requirements analysis without respect to the July 21, 2004 Ruling's cost categories. As shown in Table 3-1 above, Scenario 4 and 17 result in negative Revenue Requirement Present Values of approximately $952 million and $130 million, respectively. Accordingly, neither scenario supports the cost-effective implementation of AMI deployment. The Revenue Requirement analysis incorporates the costs and benefits derived in the business

[6] Our methodology and analysis of Value of Service Loss, by scenario, is presented in Appendix J.

[7] July 21, 2004 Ruling, p. 12.

[8] July 21, 2004 Ruling, Appendix A.

case analysis for each scenario, plus the recovery of SCE's net investment in any removed meters, and includes the rate of return and tax impacts of the AMI-related investments.

III.

OVERVIEW OF BEST CASE FULL AND PARTIAL DEPLOYMENT SCENARIOS

This section describes the effects of our "best case" full and partial deployment cases (Scenarios 4 and 17) on all of SCE's operations, processes and information technology systems. These two cases utilize all the assumptions set out in the July 21, 2004 Ruling and the functional capabilities of commercially available advanced meters and their supporting network using the radio frequency (RF) technology solution described in Appendix B. This section also contains a schedule of deployment for both scenarios, and describes how we will achieve the customer coverage required by the July 21, 2004 Ruling.[9] The two "best case" scenarios are described according to their impact on our operations, using the July 21, 2004 Ruling's five applicable cost categories. The costs and benefits of Scenario 4 and 17 are quantified in Section IV and V respectively, using the cost and benefit codes identified in Appendix A of the July 21 Ruling.

To achieve the 90 percent saturation goal set by the July 21, 2004 Ruling, full AMI deployment under Scenario 4 assumes that 4.5 million AMI meters will be installed in 97 percent of existing customer's homes and businesses, throughout our 34 service center and

[9] Because the July 21, 2004 Ruling specified a "2006 to 2021 analysis period" (Attachment A, p.12) and directed that costs and benefits be "presented as 2004 present value dollars," (*Id.*), and to maximize consistency with its prior filings in this proceeding, SCE has continued to model its AMI deployment scenarios with consistent assumptions regarding the timing of the deployments. In this application, Scenario 4 (full-deployment) and Scenario 17 (partial-deployment) continue to show deployment beginning in the first quarter of 2006, with costs summarized in 2004 present value dollars. In reality, it is not possible to deploy AMI meters in any significant quantities during 2006, due to the remaining regulatory steps (hearings, briefs, proposed and final decisions) required before any deployment can be authorized, as well as the subsequent time required to solicit and evaluate vendor proposals, and for the successful vendor to gear up production. Any reference to a 2006 deployment of meters, throughout this Application, is solely a modeling assumption, and does not mean that SCE believes deployment in 2006 is feasible.

The basic economics of the deployment scenarios would be little changed by a revised 2007 or 2008 deployment assumption; the cost and benefit estimates could be adjusted for inflation, but one or two year's escalation assumptions will not change the overall determination that AMI deployment as specified in the July 21, 2004 Ruling, when applied to SCE's specific service territory and existing operations, is not cost-effective for SCE's ratepayers at this time.

rural office locations. Our partial deployment approach under Scenario 17 is based on the assumption that AMI deployment is best suited for the portion of our service territory where we can reasonably expect to realize the greatest load reduction and demand response benefits. The portion of our service territory meeting these two criteria is located in the more highly populated areas within Climate Zone 4, as delineated in the Statewide Pricing Pilot (SPP).[10] Scenario 17 assumes that 325,000 AMI meters will be installed.

Full scale AMI deployment will require a significant planning and start-up phase prior to the start of meter installation. Key start-up activities include business process redesign, significant personnel management, and development of communications and technology infrastructure. Business process redesign will be required for meter workflow management, customer services and billing operations, and meter procurement. Both the full and partial deployment scenarios require new hires, temporary employees, and a large contingent of consultants and the facilities to support them. The procurement process for full deployment is significant with over $600 million worth of meters, technology, and contract services required. This process will require significant time to manage selection and contracting, as well as to establish the meter inventory logistics. Our preferred deployment approach requires network installation and workflow management systems to be operational before meter installations begin, in order to ensure connectivity at time of installation and thus minimize costs.

This level of start-up activity may take 18 to 24 months to complete for partial and full deployment, respectively. We have not adjusted the timeline or business case to reflect this reality, but a more realistic start-up period will be reflected in any future application for full deployment.

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[10] The Charles River Associates analysis of SPP results confirmed that the highest percentage reduction of peak-period energy use for critical peak pricing customers occurred in Climate Zone 4 of the SPP. "Statewide Pricing Pilot Summer 2003 Impact Analysis," August 9, 2004, Charles River Associates, p. 83.

A. Metering System Installation and Maintenance

This section describes the operations, processes and systems affected by AMI deployment for activities that fall under the Ruling's Meter System Installation and Maintenance cost category. This cost category involves our meter procurement, supply chain management, testing, installation, and associated support activities. In order to better explain the effect of AMI deployment on these activities, this section also describes the number of customers who would receive AMI meters in the full and partial deployment business cases and our process for determining how we arrived at those numbers.

1. Number of Customers Receiving AMI Meters

a) Full Deployment (Scenario 4)

The July 21, 2004 Ruling requires that full AMI deployment reach no less than 90 percent of SCE's customers.[11] For SCE, this means that approximately 4.2 million meters must be deployed and operational. In order to properly determine the specific coverage capabilities of the communications technology infrastructure (see Appendix B), a comprehensive study would be required to identify the specific locations that can be cost effectively supported. For example, the RF path between a specific meter and the data collector can be obstructed by hills or large structures, thus creating a RF "blind-spot" even when the meter is located within the effective range of the network. Without an actual field survey of specific locations, it is not possible to determine which or how many meters will be affected. In lieu of such a study, we are providing an estimate of the deployment needed to meet the Commission's stated full deployment objective. We estimate that we will need to deploy AMI meters to 97 percent of our 4.7 million existing meters (*i.e.*, 4.54 million meters will be deployed) so that 90 percent (or 4.2 million) of our total meters will communicate with the network, as required. We estimate that the other

[11] July 21, 2004 Ruling, Attachment A, p. 6.

three percent of our meter population will not be included in full AMI deployment because it will not be economically feasible to do so (primarily due to remote locations) or because the meters are not owned by SCE (*e.g.*, direct access (DA) customer-owned meters). For the 97 percent of the meters that are deployed, we assume that once RF networks are operational, approximately seven percent of the deployed meters will fall within RF "blind spots" and thus will not possess remote read capability due to the unique positioning of the meter itself and/or its physical surroundings. This seven percent estimate is based on SCE's experience with existing RF infrastructure and a review of the meters that will likely fall outside of the planned coverage area because of the unique geographical terrain and customer population densities.

b) Partial Deployment (Scenario 17)

It is imperative that partial deployment be large enough to gain some economies of scale, but small enough to easily manage deployment risks. We believe the more populated areas of our Climate Zone 4, with about 325,000 customers, meets these criteria. In our earlier filings in this proceeding, our partial deployment Zone 4 Scenario assumed we would attempt to include the entire meter population, or approximately 450,000 customers. However, because this geographic region includes many sparsely-populated rural areas with varying topographical characteristics, we could assume only a 70 percent success rate in being able to communicate with the installed AMI meters. In the revised analysis of this partial deployment scenario, we targeted the most densely populated portions of Zone 4, which include Victorville and surrounding communities, the Lancaster/Palmdale area, and the resort communities of the Coachella Valley, including Palm Springs. This revision eliminated many of the less densely-populated areas and allows us to assume a more economic deployment. The revision enabled a higher assumed-connectivity rate for the AMI communications infrastructure, increasing from 70

percent to 94 percent. The reduction in meter count resulted in revisions to some of our meter systems installation assumptions, which will be discussed later in this volume.

2. Roll-Out Plans

In order to fully deploy 4.54 million AMI meters in a five-year period under Scenario 4, we will be required to pursue an extraordinarily aggressive deployment schedule throughout our service territory. Our service territory is comprised of 24 service centers serving the densely-populated metropolitan areas and 10 service centers serving the expansive, yet sparsely-populated rural areas. Approximately 98 percent of the 4.54 million meters to be deployed would be in service centers serving metropolitan areas. Accordingly, we have assumed the staging of the startup to the 24 service centers of Scenario 4. The startup to the three service centers of Scenario 17 would occur as shown in Table 3-3.[12]

[12] As discussed in Section I above, SCE's analysis continues to assume a January 2006 deployment. Given the likely regulatory schedule leading to any Commission order to deploy, actual meter deployment is not expected to occur until January 2007 or later.

Table 3-3
Full and Partial Deployment Start Date by Service Center
(Scenarios 4 and 17)

Line No.	Service Center	2nd Quarter - 2006	3rd Quarter - 2006	4th Quarter – 2006
1	Covina	4		
2	Long Beach	4		
3	San Jacinto Valley	4		
4	Compton	4		
5	Ventura	4		
6	San Joaquin	4		
7	Foothill		4	
8	Fullerton		4	
9	Santa Ana		4	
10	Huntington Beach		4	
11	Ontario		4	
12	South Bay		4	
13	Thousand Oaks		4	
14	Antelope Valley	17	4	
15	Saddleback			4
16	Redlands			4
17	Palm Springs	17		4
18	Montebello			4
19	Monrovia			4
20	Santa Monica			4
21	Santa Barbara			4
22	Valencia			4
23	Victorville	17		4
24	Whittier			4

As shown above, both full and partial deployment installations are assumed to begin in the second quarter of 2006. Full deployment would start in the six largest service centers (*i.e.*, those largest in terms of number of meters eligible for deployment). Deployment efforts would be expanded to eight additional service centers in the third quarter of 2006. Deployment efforts would be expanded to the remaining 10 service centers in the fourth quarter of 2006. For the 10 service centers that serve the rural areas of our service territory, full deployment is expected to begin in the second quarter of 2006.

We expect to complete full deployment under Scenario 4 in all of the 24 service center areas by the second quarter of 2010. Partial deployment in all three service centers under Scenario 17 would be started in the second quarter of 2006. Meter installations are expected to be completed in 18 months and the communications systems are expected to be operational at about the same time meter installations are completed. Partial deployment under Scenario 17 would not involve any of our rural service centers.

This deployment strategy considered meter densities, as well as concentrations of already deployed AMR meters. We have already deployed over one-half million AMR meters throughout our service territory, concentrating in those areas where it was most cost-effective. The majority of these AMR meters are read through a van-based process contracted out to a third-party provider. To meet the metering requirements set forth in the July 21, 2004, Ruling we expect to replace these AMR meters with AMI meters and prematurely terminate the meter reading contract. In order to mitigate the effect of AMI deployment on the investment in AMR, we considered the concentration of AMR meters associated with each service center. We would begin replacing the AMR meters as late in the deployment phase as possible in order to mitigate costs associated with stranding the AMR investment.

3. Annual Deployment Volumes

Table 3-4 shows the annual volumes of AMI meters to be installed under the full and partial deployment scenarios.

Table 3-4
AMI Deployment
Number of Meters and Year of Deployment

Line No.	Year	Full Deployment (Scenario 4)	Partial Deployment (Scenario 17)
1	2006	562,230	324,603
2	2007	1,129,665	-
3	2008	1,132,763	-
4	2009	1,135,861	-
5	2010	579,652	-
6	Total	4,540,171	324,603

The numbers in the above table only reflect initial installations and do not include replacements for meter failures or meters to accommodate approximately two percent annual customer growth. These subjects will be discussed in later sections.

4. Description of Meter System Installation and Maintenance Activities

The meter system installation and maintenance cost category includes all of our activities associated with meter procurement, supply chain management, testing, installation, and other required support. The effect of full and partial AMI deployment on these activities is described in detail below.

a) Meter Procurement

Based upon the various types of meter sites in our service territory, we expect to procure four different types of meters for AMI deployment. In addition to procuring the AMI meters, we will modify some of our inventory activities to accommodate full deployment. In the full deployment scenario, each newly procured meter will be equipped with a Radio Frequency Identification (RFID) tag. This allows us to automate the procurement and supply chain processes from initial receipt of the meter from the vendor all the way through dissemination of the meters to field personnel for installation. Under the partial deployment scenario, we will not need to make many changes to our inventory activities and we will not need to convert to the RFID systems to successfully accomplish the smaller scale roll-out.

b) Supply Chain Management

Currently, SCE's Procurement and Material Management (PAMM) group receives, stocks, and distributes approximately 120,000 meters per year. Under full deployment, the PAMM organization will increase its meter distribution to a peak of approximately 1.3 million meters a year, whereas, under partial deployment, meter distribution will increase by approximately 325,000 meters. In addition, under full deployment it is estimated that there will be approximately 1.5 million additional meters that will need to be distributed over the duration of the project, due to meter replacements that result from failures in the field. Meter failures may be attributed to hardware/component failures or technology related radio-frequency interference impeding meter data communications.[13] Under partial deployment, meter replacements due to failures are expected to total approximately 144,000. The estimated number of meter failures, by year under full and partial deployment, is shown in Table 3-5 below.

[13] AMI Technology failures are discussed in Appendix C.

Table 3-5
Estimated Meter Failures by Year

Line No.	Year	Full Deployment	Partial Deployment
1	2006	21,379	10,988
2	2007	167,893	31,925
3	2008	142,724	16,178
4	2009	120,071	9,646
5	2010	92,025	6,399
6	2011	91,863	6,375
7	2012	91,671	6,349
8	2013	91,451	6,323
9	2014	91,200	6,292
10	2015	90,926	6,262
11	2016	90,628	6,231
12	2017	90,305	6,199
13	2018	89,960	6,165
14	2019	89,594	6,131
15	2020	89,206	6,095
16	2021	88,799	6,058
17	Total	1,539,692	143,616

Given our prior experience with meter vendor reliability, we propose to maintain approximately three months worth of inventory in our distribution facility. In order to meet the full deployment schedule described in Table 3-3, the distribution facility will need to begin stocking meters three months prior to distribution. This will allow PAMM to distribute 100,000 meters per month to various SCE locations beginning in January 2006 to support deployment and installation beginning in April 2006.

PAMM will deliver meters to the service centers one to two times a week so that materials are received on a just-in-time basis. This strategy will reduce the need for additional, secure storage structures at multiple facilities. Additional personnel will be required at service centers to process the meters when they are received. The meters will then be stored in a secure area until they are scheduled for distribution to installation personnel. Due to the short-term nature of the deployment effort, we propose

to use a Temporary Project Accountant position to process meters at the service centers.[14] Such Temporary Project Accountants will also be responsible for distributing meters to installers on an installation schedule that will be developed. Once the installers replace existing meters with new AMI meters, the returned meters will be processed at the various service centers for salvage purposes.

c) Meter Testing

Under both full and partial deployment scenarios, we plan to test 100 percent of the first two meter shipments of residential meters for quality assurance purposes. After that point, we will use a statistically significant sampling method to test the meters. For commercial meters, we plan to test 100 percent of the first 10,000 commercial meters for quality assurance purposes. After that, we plan to use a statistically significant sampling method, similar to the residential meter testing, for testing the remaining meters.

Meter testing will be conducted at our existing meter shop facility. This facility will need to be reconfigured to handle the increased volume of work. Although AMI deployment will reduce some existing meter testing work, the meter testing workload will increase overall due to the scale and pace of AMI deployment. As such, additional personnel will be required to handle the increased testing activities.

d) Meter Installation

(1) Residential and Small Commercial (Less Than 20 kW)

In both full and partial deployment, we intend to utilize existing field services and meter reading personnel to install the AMI meters. Since the communications network and information technology applications related to AMI will not be operational until the third-quarter of 2007, for the first year and one-half of the

[14] Use of this temporary position assumes that we will be able to secure IBEW approval for such a position.

installation phase we will have to hire additional personnel to complete these installations while continuing our current level of meter reading and field service activities. Because this overlap period is short term in nature, we plan to use existing Meter Readers and Field Service Representatives to perform the installations and backfill the meter reading positions. As AMI becomes operational, we will eliminate the excess personnel through normal attrition. We expect this will allow us to avoid incurring any severance costs for full-time resources as AMI deployment concludes. The use of these temporary resources depends on the assumption that we will receive IBEW concurrence to reactivate the "Project Temporary Meter Reader" job classification and approve the creation of "Project Temporary Installer" and "Project Temporary Apprentice" job classifications.[15] We also expect to make use of mandatory overtime during the most pressing stages of deployment. Given the cost and performance trade-offs of utilizing overtime as an alternative to hiring incremental personnel, we expect to utilize both of these options.

(2) Complex Meter Installations

In our service territory, we have approximately 275,000 meters that are considered complex and therefore must be installed by Meter Technicians operating out of our Meter Services Organization (MSO). The partial deployment scenario includes approximately 18,000 complex meters. These complex meters are typically associated with Rate Schedule GS-2 and accounts with monthly demands above 20 kW. These also include all 430 volt accounts, network meters, and current transformers type metering. In order to support the aggressive full deployment schedule, we will rely on both full-time and contract resources, as well as the use of mandatory overtime, to install these complex meter configurations.

[15] IBEW approved the use of the project temporary meter reader job classification for the AMR deployment which took place in 2000. If represented employee labor were required, the cost estimates for meter installation could change.

e) Support Related Training Costs

In order to support AMI deployment, our field personnel will need to attend various training classes. As new Meter Readers are hired to temporarily backfill for those who have taken Field Service Representative or Project Temporary Installer positions, they will need to attend new hire meter reading training. As existing Meter Readers transition to Field Service Representative (FSR) positions, to backfill for those FSRs who have taken Project Temporary Installer positions, they will need to take classes focused on FSR field activities, including but not limited to the handling of billing inquiries and the use of various field tools such as those linked with customer service systems. Project Temporary Installers, who will handle the meter installations for the residential and less than 20 kW commercial accounts, will also need to undergo training that covers the meter installation procedures and practices as well as required training for field deployment activities and the use of our meter tracking systems.

B. Communications Infrastructure

The radio frequency communications system selected for AMI deployment will be comprised of collectors, packet routers, and Metricom Communication Controller (MCC) take-out points.[16] This AMI technology solution leverages and expands on our already-existing network. New collectors will be mounted primarily in the power space of a utility pole or streetlight and will communicate with the radios in the residential and small commercial meters to transmit meter data throughout the network to the MCC take-out points. In the RFI response, the vendor indicated that SCE would need to install 8,000 collectors throughout the service territory in order to achieve the 90 percent coverage requirement of full AMI deployment. Based upon our experience with the RF infrastructure currently operating within our service territory, we believe it is prudent to

[16] The AMI communications infrastructure is described in Appendix B.

install an additional 20 percent, or 1,600 collectors to achieve the 90 percent coverage assumed in the full deployment case. As such, our full deployment business case analysis assumes the installation of 9,600 collectors and the partial case assumes 928 collectors will be installed.

The meter technology for greater than 20 kW customers includes the use of a "radio under the meter cover" technology that will provide a RF "mesh-type" network of an additional 168,000 radios under full deployment (16,000 under partial deployment) to the overall AMI communications network. Given the heavy concentration of meters in both scenarios, we anticipate heavy congestion on the communications network, particularly for those locations in close proximity to the MCC take-out points. The installation of packet routers will help ease this congestion and ensure that data is transmitted to SCE's network in a timely manner so that it is available for bill calculation. We have assumed the installation of 96 packet routers for full deployment and 10 for partial deployment.

Installation of these MCC take-out points is required to collect the meter data and transmit it to our computing network where it can then be accessed for billing purposes. Under full deployment, we expect to supplement the existing 100 MCC take-out points we have in place today with 181 additional MCC take-out points. Under partial deployment, there will be 18 supplemental take-out points.

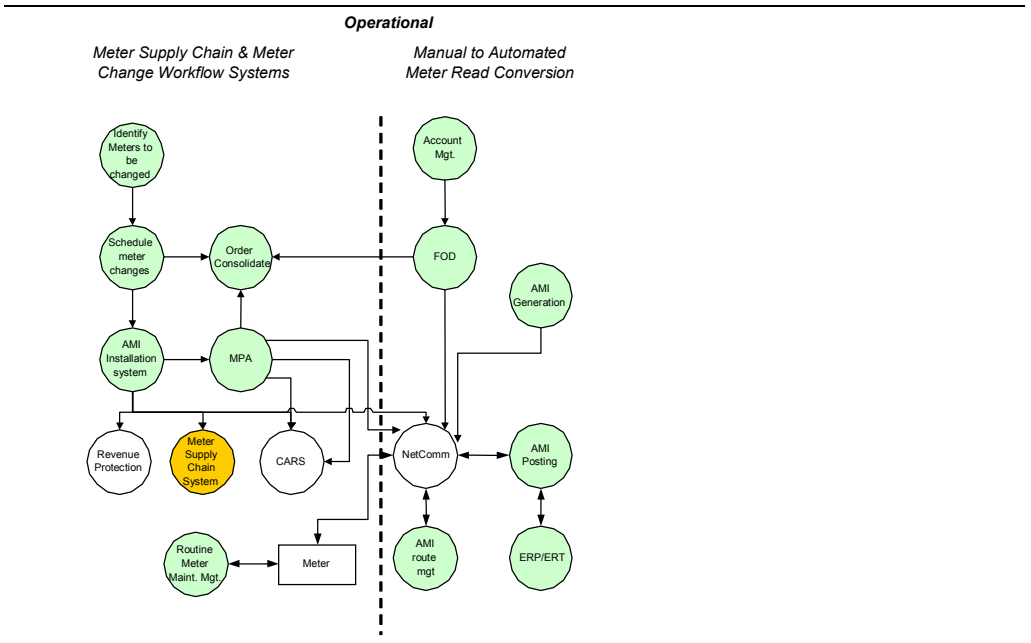
C. Information Technology Infrastructure

The Information Technology (IT) and Application cost category captures the costs associated with applications and computer services necessary to support AMI. These activities are described in more detail in the following two sections, the first relating to meter installation and meter reading applications, and the second relating to data management systems.

1. Meter Applications

Full deployment will require enhancement of certain existing meter management and meter reading data management systems, as well as development of new ones. Figure 3-1 illustrates the IT systems that will be required for AMI deployment.

Figure 3-1
Full AMI Deployment—IT Systems Architecture



The IT systems that need to be developed or enhanced to support AMI deployment are in the operational areas of meter supply chain management, meter change workflow, and meter read conversion. The following subsections briefly describe each of these operational areas and the systems that will be developed or enhanced to support AMI deployment.

a) Meter Supply Chain Management

We will utilize the existing Meter Supply Chain (MSC) system, with supplemented resources, as necessary, to assure that current procurement processes will meet the requirements of AMI deployment. These activities include but are not limited to, order and delivery tracking from the meter vendor, verifying receipt of the meters and reconciliation with the order, logging the meter as an SCE asset, testing of new meters, and distribution of meters from the Warehouse to Service Center locations for installation.

Under full deployment, each pallet of meters received from the vendor will be equipped with RFID tags. Upon receipt of the meters in SCE's warehouse, the RFID tags on the meters and pallets will be "read" into the system to verify and reconcile the order. RFID tags on individual meters will transmit unique asset identifications into the MSC system to track meters throughout the entire deployment workflow. The MSC system will register meters as SCE assets and manage the distribution of the meters to our service centers for installation. The RFID tracking system will not be utilized for partial deployment.

The MSC system will also be capable of interfacing with several related systems. For example, the MSC system will interface with the AMI Installation System, described later in this section, to pass meter delivery information automatically to the service centers. Further, the MSC system will interface with SCE's general ledger system to record new and retired asset information as meters are replaced and installed during full deployment.

b) Meter Change Workflow Systems

As shown in Figure 3-1 above, a new IT system will be needed to handle the meter change workflow process. This application will identify the meters that will be changed to AMI metering and will interface with the MSC system to identify the exact meters to be installed at each customer site. An additional application will be

developed to track and schedule meter change orders. Our current Meter Process Automation (MPA) system handles meter change requests at an individual meter site level and cannot handle the significant volume of meters involved in full or partial deployment.

Under full deployment, the new Scheduling Meter Change (SMC) system will need to interface with the new AMI Route Management system that verifies that all meters for a route are, in fact, ready for AMI integration. The SMC system also automates the switching to the AMI network and will need to interface with the current Customer Data Acquisition Management (CDAM) system which maintains the route information. Building this interface will ensure that the SMC system efficiently schedules meter change orders. The new SMC system will also be used to track planning activities (*e.g.*, city or SCE field inspections) related to AMI meter installation. This system will have the ability to issue and cancel orders, as well as schedule appointments or reprioritize orders as field conditions warrant.

The AMI system will also interface with the SMC system to reschedule orders that were not completed. This system will also generate various exception situations that will require special processing. An order download/upload process will be built to perform interface functions between the host mainframe system and the Wireless Laptop System in the field. The users of the Wireless Laptop System will have the capability to view orders and input completion information. The Wireless Laptop System will also allow users to cancel or defer orders, if appropriate.

As a result of AMI deployment, a new system is required to interface with the existing MPA system which currently schedules, tracks, and posts data related to meter sets changes and removals. An Order Consolidation (OC) application will be developed to examine various meter orders for the same installed service account, to consolidate them, and maximize operational efficiency.

c) Meter Read Conversion

As shown in Figure 3-1, under AMI deployment, a number of new applications need to be developed to handle the meter read conversion. We expect that enhancements to the current Account Management (AM) system will be required. The AM system is responsible for various administration and maintenance activities associated with each customer's account. User functions will need to be modified to handle interval data usage. For example, the Bill Correction function will need to be changed so that users have the ability to input interval data usage in situations where the data is "missing" for certain periods of time. Another example of a user function requiring modification involves changing the data validations and prorating algorithms to handle interval data usage.

We also expect enhancements will be needed to the current Field Order Dispatch (FOD) system to accommodate the meter roll-out. The FOD system is currently responsible for the management of field visits related to metering and metered data communications and may include error detection, failures, and replacements. Enhancements are required to route field events from the FOD system to the AMI communications network support group and meter support groups.

AMI deployment will also require the development of a new system to monitor the status of accounts on each of the meter reading routes. This system will determine when all of the installed AMI meters on a particular route are communicating with the network. Once this new AMI Route Management system has validated that all newly installed AMI meters on a route are successfully communicating with the network, the meter reading route can then be switched to an AMI route and manual meter reading can cease.

We expect AMI deployment will require system modifications in order to generate requests for meter reads from the communications network. An AMI

Generation System will be developed to identify and generate accounts that are scheduled to be billed on any particular day. Based upon this data, the AMI Generation System will create requests for the network to gather meter data from these accounts so that bills can be prepared.

A new system is needed to collect meter read information from the AMI communications network, validate the data, and post the data in the Customer Service System (CSS) meter reading tables. If the data fails certain validations, the new AMI Posting system will generate a new exception to be included in the CSS exception table.

We anticipate that AMI deployment will require enhancements to the existing Exception Reporting and Routing (ERR) System, which is responsible for reporting, routing, and handling various exceptions. Enhancements will be made to the ERR System so that non-communicating equipment (meters, collectors, *etc.*) will be reported to the ERR system from the network through an electronic file. Additionally, enhancements to the ERR System will be developed to address new exceptions created by AMI processes. If exceptions cannot be resolved automatically by the ERR System, they will be routed to a bookkeeper for resolution.

Each of the new or enhanced systems represented in Figure 3-1 require computing services infrastructure to support all software supporting the collection and processing of AMI data. With the exception of RFID processing requirements, these services are the same for full and partial AMI deployment; although the magnitude and cost of these services is scaled back considerably for partial deployment. Computing Services includes the actual procurement, installation, and maintenance of the necessary infrastructure. Computing Services infrastructure and hardware additions fall into the following broad areas:

- Additional servers;
- Additional processors to increase MIPS on the mainframe;

- Additional processors to increase processing capacity on Reduced Instruction Set Computer (RISC) and Wintel systems;
- RFID tag reading equipment (full deployment only);
- Additional laptop and desktop computers;
- Additional Storage (DASD);
- Incremental personnel to manage installation of additional infrastructure;
- Additional operating system and database licenses; and
- Computer network upgrades.

2. Data Management Applications

The introduction of massive volumes of interval data will require enhancements to our Service Billing, Usage Calculation, Wholesale Settlement, and SCE.com systems. The discussion that follows provides a brief description of necessary enhancements to these systems.

a) Service Billing

Enhancements will need to be made to our Service Billing System, which provides the core functionality to calculate customer bills. The terms of each of the rate schedules are translated into "service plans" and stored within the Service Billing System. A service plan defines the types and levels of charges and specifies how a billing statement will be calculated for a service account. Under both the full and partial scenarios, new tariff schedules will be introduced. As a result, changes will need to be made to the Service Billing System to include the resulting service plans so that billing statements can be calculated.

b) Usage Calculation

A core system functionality needed to support AMI involves the processing of interval data. Currently, we have a fairly small-scale system, called the

Customer Data Acquisition system that handles calculating usage for existing customers with interval meter data. We will need to develop a new Usage Calculation System in order to handle the large volume of interval data that will be associated with the AMI deployment. As 15-minute data intervals are collected from meters, they will be transferred to the Usage Calculation System. The data will then be aggregated into values corresponding to the applicable season and time periods dictated by the terms of the service plan. Once aggregated, this data is transmitted to the Service Billing System for bill calculation and, in the full deployment scenario, to the Wholesale Settlement System for financial settlement.

c) Wholesale Settlement

Under the full deployment scenario, significant enhancements will need to be made to the Wholesale Settlement System. This system handles calculating various settlement charges related to power procurement activities with the California Independent System Operator (CAISO) and other counterparties. In the current system, the hourly usage values that are used to determine these settlement charges are calculated using load profiles, which are applied to monthly reads. Once AMI is fully operational, the usage data received for wholesale settlement will be actual interval usage data, replacing the use of load profiles. As such, under full deployment, the Wholesale Settlement System will need to be enhanced to handle the aggregation of the increased volume of actual interval usage data associated with the 4.5 million AMI meters. The data needs to be aggregated by customer class and associated with the appropriate generation schedule and generation resource usage data in order to calculate settlement charges. Under partial deployment, we will continue to use load profiles to determine CAISO settlement charges and no changes will be made to the Wholesale Settlement System.

d) SCE.com

Significant enhancements will need to be made to SCE.com in order to facilitate customer participation in demand response programs, as well as accommodate the expected increase in customer access. Currently, SCE.com provides customers with their monthly energy usage data and corresponding monthly costs. In terms of additional user functionality, residential customers will have the ability to view their hourly energy usage data from the previous day while commercial and industrial customers will be able to view 15 minute data intervals from the previous day. It is anticipated that customers will have access to available interval data for up to 13 months and will be able to view charts and graphs for comparing applicable data. Customers will also be able to access analytical tools to help them manage energy usage and control their energy-related costs. Customers will be able to view and monitor CPP rates and event details.

A key assumption driving the cost of these enhancements is related to the increased traffic expected on SCE.com. The concurrent website "hits" are expected to increase significantly, especially before, during or shortly after a critical peak event.

D. Customer Service Systems Category

This section describes the customer service operations, processes, and systems that are affected by AMI deployment. These changes are needed to sustain a high level of customer services throughout the installation phase of AMI deployment. Specifically, the customer services-related operations discussed in this section include Billing, Call Center, Meter Order Processing, and Customer Communications (Marketing) activities. This section will not discuss meter reading and field services activities, because these functions are covered in the Meter System Installation and Maintenance category discussed previously.

1. Description of Billing Activities Affected by AMI Deployment

SCE's Billing Organization currently processes and delivers over 56 million customer billing statements each year. For the most part, this process is automated and only a small percentage of the total bills produced require manual intervention. Historically, the two situations having the largest impact on the manual billing processes are meter changes and rate structure changes, both of which will occur in significant numbers under AMI deployment. Under full and partial deployment of AMI, we will need to convert the current billing system from one that depends primarily on monthly meter reads in the field to a system that will generate bills based almost entirely on hourly and 15-minute interval data transmitted daily through the network communications system. At the outset, we expect the need for start-up costs associated with the specification of security systems, the development of data retrieval strategies, network planning, and the meter RFP proposal specifications. Installation and on-going O&M costs are expected to result from a large increase in the number of billing exceptions that are expected to result due to meter changes, meter failures, communication system failures, and interval data processing.

a) Meter Change Exceptions

The largest effect of AMI deployment on the Billing Organization's operations and processes occurs during the installation phase and is a result of the mass exception processing that is expected to occur as meters are replaced. A small percentage of the replaced meters will result in billing-related problems (exceptions) requiring manual processing to assure timely and accurate billing. A variety of problems including broken or non-registering meters, mislabeled or switched meters, and missing meters (cut-in-flat services, *etc.*) are expected to be discovered. Though small in terms of percentage of the total, the initial replacement of such an unusually large quantity of meters will result in a significant increase in the number of billing exceptions being processed.

b) Meter Failure Exceptions

In addition to the 4.5 million original installations, under full deployment billing operations will be affected by the replacement of an additional 1.5 million meters due to meter and/or communication failures throughout the 15-year analysis period. Under partial deployment, in addition to the original 325,000 installations, approximately 144,000 failed meters will be replaced. We estimate that 50 percent of all meter failures will require exception processing. For full deployment, meter failures are expected to peak at 168,000 in 2007, and drop to 92,000 by 2010. For partial deployment, meter failures are expected to peak at 32,000 in 2007, and drop below 6,400 by 2011. We expect, however, that beyond the initial installation phase, meter failures will continue at a steady state rate of approximately two percent throughout the meter's useful service life.

When a meter fails in the middle of a billing period, a determination must be made as to how the affected bill (and subsequent bills) will be processed. With AMI metering, this process becomes considerably more complex because the affected account depends on the accuracy of interval consumption data. Depending on the nature of the meter failure, a judgment call is often required with regard to estimating consumption. This sometimes involves contacting the customer in order to assure a fair and equitable resolution. A similar process is followed when rate related billing exceptions occur.

c) Communication System Failures

Reading meters remotely adds a whole new layer of data quality concerns. These concerns are not only attributable to new meter technology, but also to the likelihood of communication system failures, which will inevitably occur. We know this from experience, not only with the recent implementation of RTEM, but from our earlier experience in implementing 350,000 van-based AMR meters. In order to sustain

the current high level of billing accuracy and timeliness will require the development of new validation routines. For example, a simple comparison of the total of all interval consumption during a billing period may not match the difference between that months beginning and ending registration. This validation failure may trigger an automatic reread and, ultimately, a manual field inspection and "check read" to determine the nature of the problem. This situation may also require the use of a data "plugging" routine to automatically insert the missing interval data.

d) Interval Data

Under Scenarios 4 and 17, both of which include implementation of CPP rates, the processing of interval consumption data has a significant impact on billing costs because virtually all accounts will require interval data processing in order to determine consumption and demand readings by time period and/or during critical peak periods. The processing of interval usage data is vastly more complex than simple, monthly meter reads and requires an additional layer of validations and the resultant exception processing in order to assure the integrity of each 15-minute or hourly read and to assure that the summation of all interval consumption throughout the billing period does, in fact, match the difference between the meters starting and ending reads for the same period.

2. Description of Call Center Activities Affected by AMI Deployment

Our Call Center receives and handles over 11 million calls per year. Full deployment of AMI is expected to result in call volume increases of approximately 1 million calls during the peak year of deployment, then settle down to approximately 100,000 additional calls per year after 2010. Partial deployment of AMI is expected to result in a call volume increase of approximately 185,000 calls during the peak installation phase and settle down to approximately 6,000 additional calls per year for the duration of the project. This call volume increase is expected to result from customers

calling to inquire about a variety of issues ranging from the new meter being installed to questions about the new tariff structures, including but not limited to questions about opting-out of the new CPP default rate. Our call volume estimate includes the number of customers who will opt-out, in addition to a number of customers who will call to inquire about opting out, but who ultimately choose to stay on the new rate. In determining the impacts on the Call Center operations due to full and partial AMI deployment, we estimated that 70 percent of the customers that call to inquire about opting-out would actually opt-out of the new tariffs. This estimate is based on our assumption that most customers who call to opt-out will have already made up their mind, however, with proper training of Call Center personnel, approximately 30 percent of such callers will be convinced to continue with the program.

We expect that once AMI is fully deployed and operational, call volume reductions will result from more accurate billing. Billing inquiries today are received for several reasons, one of which is an inaccurate meter read. Based on analysis of 2003 data, 22,791 calls were a result of meter reading errors. We used this number as a percentage of all calls to determine the percentage of calls that would be projected as meter read error calls. For the business case, we assumed that 100 percent of these calls would be avoided with automated meter reads. Ultimately, we expect call volume to be reduced by approximately 24,000 calls per year for full AMI deployment under Scenario 4 and 1,700 calls per year for partial deployment under Scenario 17.

E. Management and Miscellaneous

This section describes the overall Project Management and miscellaneous costs not included in other cost categories. Other costs include centralized training costs, personnel recruiting costs, employee communications, and miscellaneous start-up related costs. For the most part, these costs are categorized as "start-up" and "installation" costs. The

Billing Organization has identified some on-going O&M costs that are expected to continue through the duration of the analysis period.

1. Program Management

For full deployment scenario, a program management team consisting of eight SCE middle management and two SCE-staff support personnel will oversee the five and one-half year installation and system development phase of the full deployment project. After installation, one SCE Program Manager and two staff personnel will remain to oversee the program for the remainder of the analysis period. We also anticipate the need for as many as 18 contract personnel to support the program management effort in the initial year of installation (*i.e.*, 2006) dropping down to 12 for the remainder of the installation phase (*i.e.*, 2007 -2010). For the partial deployment scenario, a program management team consisting of eight SCE middle-management and two, SCE-staff, support personnel will oversee the one year installation and system development phase of the project. After installation, one SCE Program Manager and two staff personnel will remain to oversee the program through 2010. We also anticipate the need for as many as 10 contract personnel supporting the program management effort during the initial installation phase in 2006.

In addition, each of the major operating departments has estimated some project management costs to support the core project management team. We have also determined that in order to meet the deployment schedule proposed in the July 21, 2004 Ruling, with deployment starting in 2006 and full deployment by 2011, there will likely be project planning tasks that should occur even earlier. However, these earlier program management costs are not included in this filing.

2. Training Costs

Under the full deployment scenario, training costs would be incurred within each of the major operating organizations as well as at the corporate level within our

centralized Job Skills Training (JST) Organization. Incremental training costs will be incurred not only for specialized instruction related to AMI metering activities and new rate options, but a significant part of the increased training cost will be more generalized, new-employee training. Our JST training includes the cost of curriculum development, preparation of training materials, and payment of instructors. JST training is primarily for new employees in the Meter Reading, Call Center and Billing organizations needed to meet the workload added during the installation phase of AMI. These costs do not include paying the employees themselves for the "seat time" spent in training sessions. Seat time costs are included in the cost estimates for each individual operating organization.

3. Customer Communications

During the installation phase, we expect only a minimum level of direct, customer communications costs beyond what we currently experience. If we are required to notify customers of planned meter changes, we expect to comply through a regular monthly bill insert or bill message. Any mass media or other outbound communications that the Commission directs is needed for purposes of public notification during the installation phase would add incrementally to our estimated costs. Once installations are complete and the new CPP rate goes into effect, a significant and sustained outreach campaign will be needed. The strategic approach of the campaign is to use an integrated mix of media designed to minimize the customer opt-out rate, retain customers on the CPP rate over time, and affect a long-term cultural and behavioral change for the purpose of maximizing demand reduction from participating customers. The campaign must be multi-year in order to positively affect long-term change.

a) Campaign Overview

Given the scope of the AMI effort, we need to develop and implement a multi-year campaign in order to positively affect long-term change and deliver the

anticipated demand response levels over the full duration of the project. There are two strategic tenets of the campaign:

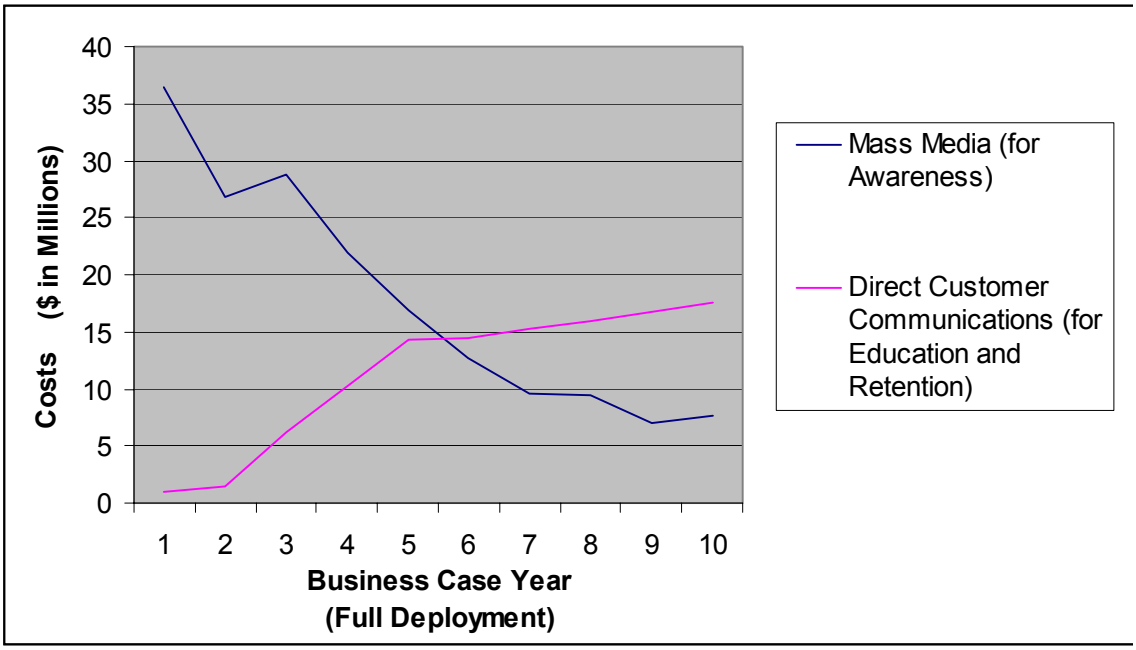
- Mass media will be utilized initially at "heavy" levels and over the life of campaign at "maintenance" levels, to build and maintain awareness about the program and to minimize the opt-out rate initially and over time, and

- Direct customer communications will be utilized throughout the life of the program. We expect to develop and implement a comprehensive educational campaign designed to help customers modify behavior while on the AMI program in order to maximize demand reduction from enrolled customers. We also plan to develop and implement a direct-communications retention campaign to maintain the customer base over time.

b) Communications Media

As shown in Figure 3-2, during the course of the campaign, the weight and mix of media and direct communications as well as the overall cost will change to reflect the communications support required.

Figure 3-2
AMI Customer Communications—Media and Direct Customer Communications Mix



To make outreach as effective as possible, we will conduct research with our customers to understand consumer attitudes and adapt messaging appropriately for all geographic and ethnic groups prior to the delivery of the campaign. Using this research, we will develop an on-going campaign that includes communication and outreach that is designed to reach 100 percent of our customers. We intend to saturate the customer base with a broad-based awareness and educational campaign, as well as specifics on how customers can respond to time-differentiated rates. The media mix we envision for the campaign includes mass media, targeted/ethnic media, direct communications, and "CPP Day" notification.

(1) Mass Media

Use of mass media will extend to television, radio, and print media for education and awareness. For example, for the general English-speaking market, we envision cable and/or television spots to run for 6-12 weeks over a 12-24 week

time period where ads would be seen by targeted customers an average of two to four times per week, radio ads to run for two, 8-week periods, where ads would be heard by targeted customers approximately one time per week, and printed information to appear on ½ page inserts in daily, weekly, and monthly publications up to 12 times per year.

(2) Targeted/Ethnic Media

Use of this will extend to local print, cable television, and strategic partnerships (ethnic business chamber promotion) including the use of in-language media for education and awareness targeted to SCE's diverse customer base. For example, we envision cable and/or television, radio, and printed information to run on the same schedule as the schedule for the general English-speaking market, but be targeted to the appropriate ethnic-based media (*e.g.*, Asian, Spanish, and African-American) to reach SCE's diverse customer base.

(3) Direct Communications

Use of direct communications will include bill inserts, direct mail, e-mail notification, voice mail notification, newsletters, and face-to-face communication through the account management function. This will be used for retention and behavior change education meant to help customers maximize demand reduction. Specifically, we envision utilizing a variety of direct customer communication tactics staged over a designated period of time to maximize reaching our customers and the frequency with which they hear our education and retention messages, thus, driving behavior change.

(4) "CPP Day" Notification

We expect to use an automated phone messaging system and press releases/press relations to notify customers of CPP Demand Response events.

c) Campaign Goals and Objectives

The AMI media campaign will differ significantly from those previously undertaken by SCE. Previous campaigns were designed to create customer awareness and promote programs on a short-term basis. This campaign will utilize educational information and tools to help customers make the behavioral changes required to comply with the new CPP rate structure. The purpose of this campaign is to maximize demand reduction from participating customers, as well as create retention information designed to retain customers on these rates over time. Long-term customer enrollment and long-term behavioral and cultural change are essential to AMI's success. One of the two main objectives of the campaign is to teach customers about why CPP rates require a behavioral change and move them toward such behavioral change. Through education, we expect to achieve customer understanding of their energy usage and offer them information and tools to manage their usage under these pricing options. This will be achieved through the customer-specific education portions of the campaign. The campaign's other main objective is to minimize the customer opt-out rate and retain customers on the CPP-rate program over time. This will be accomplished through the customer-specific retention portion of the campaign.

The cost of this type of campaign is significantly affected by SCE's unique Southern California location as it relates to mass and in-language media costs. Our service territory sits in some of the most expensive advertising costs/media outlets in the United States. The greater Los Angeles area, including Climatic Zone 4 communities, is the second largest and highest cost media market in the country. It is also both linguistically and culturally diverse.[17] As such, messages must be created and delivered in languages other than English. Additionally, 35 percent of our customer base has

[17] 2003–2004 Nielson Universe Estimates, DMA Ranking and Advertising Age Magazine, July 24, 2000

demonstrated a lack of interest in electricity issues other than when their power goes out.[18] Customer communications must break through this demonstrated low level of interest and be accomplished through a variety of linguistically and culturally appropriate approaches to properly address various Asian, Spanish-speaking, and African-American communities, as well as the general population.

Our forecasted average, yearly, media and advertising costs related to customer communications and education for the Demand Response scenarios are close in comparison to media and advertising costs for other utilities (such as telecommunications utilities) in the Los Angeles Designated Market Area.[19]

4. Management and Miscellaneous Other Costs

This cost category includes other areas where miscellaneous costs have been identified. These include overseeing the vendor request for proposals (RFP) process, contracts supervision, employee communications costs, personnel recruiting, and employee training and communications relating to customers' access to their own energy usage data. Other management overhead costs spanning two or more functional cost categories, such as project management and the administration of job skills training, are also included in this cost category.

[18] ARD0075 Residential Segmentation: Southern California Edison Customer Segmentation Research, December 2003.

[19] 2004, Nielson Media Research.

IV.

BEST FULL DEPLOYMENT BUSINESS CASE ANALYSIS (SCENARIO 4)

This section provides our full deployment business case analysis for the "best case" Scenario (Scenario 4) as presented in our January 12, 2005, compliance filing. The following sections describe the costs and benefits we expect will result from implementation of this scenario. These costs and benefits are described as "incremental" to our "Business As Usual" case, as presented in Appendix G. As previously described, "full deployment" means replacing 97 percent of our existing 4.7 million meters over a five-year time period, and building the communications infrastructure to allow us to read at least 90 percent of these meters remotely.

These costs and benefits have been quantified using the July 21, 2004 Ruling's assigned cost and benefit codes. We also present a discussion of the uncertainties and risk analysis for this scenario, as well as a discussion of the NPV analysis. The operational activities, processes, and procedures affected by full deployment under this particular scenario were fully discussed in Section III above.

The default rate for Scenario 4 is CPP-F for residential customers, and CPP-V for C&I customers. Scenario 4 results are summarized in Table 3-6.

Table 3-6
Summary of Cost/Benefit Analysis for Scenario 4
($Millions)

Costs	Benefits	Pre-tax Sub-Total	After-Tax NPV	Rev. Req. Present Value
($1,298.4)	$804.6	($493.8)	($402.9)	($951,815)

A. Costs

Appendix A to the July 21, 2004 Ruling separates AMI deployment costs into six broad cost categories: (i) Meter System Installation and Maintenance, (ii) Communication Systems, (iii) Information Technology and Applications, (iv) Customer Services, (v) Management and Other, and (vi) gas service costs (which are not applicable to SCE). The July 21, 2004 Ruling also establishes 79 different cost codes applicable to these cost categories that must be used for analytical purposes. Under this full deployment scenario, we expect to spend a total of $1.3 billion, including operational and capital investment related costs.[20] Table 3-7 below summarizes our estimated costs in the five cost categories.

Table 3-7
Summary of Costs for Scenario 4
(000s in 2004 Pre-Tax Present Value Dollars)

Line No.	Cost Categories	Total
1	Metering System Infrastructure	$668,399
2	Communications Infrastructure	41,974
3	Information Technology Infrastructure	206,003
4	Customer Service Systems	211,459
5	Management and Miscellaneous Other	170,578
6	**TOTAL**:	$1,298,413

1. Meter System Installation and Maintenance

The July 21, 2004 Ruling's MS-1 through MS-11 cost codes correspond to the costs associated with procurement, supply chain management, meter testing, installation and associated support costs. The following subsections describe our analysis of the costs falling into each of those cost codes.

[20] As specified in the July 21, 2004 Ruling, all costs are presented in 2004 pre-tax present value dollars unless otherwise stated.

a) Meter Reader Transition Costs (MS-1)

For the 24 service centers in our metropolitan areas, we assume that current FSRs and Meter Readers will be selected for the Project Temporary Installer positions, as discussed further in cost code MS-5. A number of our existing Meter Readers will be upgraded and trained to fill the positions of the FSRs placed in the Project Temporary Installer positions. There will also be vacancies in the Meter Reading staff as existing Meter Readers fill new positions such as supervisors, revenue protection investigators and administrative staff needed to support the AMI deployment. Beginning in 2006, we estimate that we will have 288 vacancies in our meter reading staff caused by employee movement to other areas supporting AMI deployment. We plan to fill those vacancies by staggered replacement through the third quarter of 2006.

A critical factor considered when filling these positions is the productivity differential between a new meter reader and an experienced meter reader. During the first month, we assume that new Meter Readers will perform at 60 percent of the productivity standard of experienced Meter Readers. Their performance steadily increases and by their sixth month, new Meter Readers must perform at similar productivity standards as an experienced Meter Reader. Given this productivity differential, we will need to hire 104 additional project temporary Meter Readers during 2006 in order to achieve the same levels of productivity we would achieve with an experienced Meter Reading staff. We assume that these 104 incremental Meter Readers leave the organization through attrition as productivity increases by the end of 2006. Accordingly, the anticipated Meter Reader transition cost in 2006 is $5.9 million.

For the 10 service centers in our rural areas, we will be relying on our existing FSRs to handle installations. Existing Meter Readers will be upgraded and trained to handle FSR job responsibilities to fill in for FSRs taking the Project Temporary Installer positions. We plan to fill the vacancies in our Meter Reading staff with project

temporary Meter Readers. We estimate that we will need eight project temporary Meter Readers throughout the 2006 to 2010 deployment period at a cost of $2.0 million.

The reduction of 80 percent of our current meter reading organization is expected to take place through normal attrition during the latter phases of AMI deployment. Our current attrition rate is 35 to 40 percent annually. Attrition is expected to ramp-up beginning with the activation of the AMI communications system (approximately 18 months after AMI installations begin) and continue throughout the deployment years. Severance of 32 supervisory personnel will result in a one-time cost of $1.9 million in present value dollars.

b) Supervision of Installer Workforce (MS-2)

With the addition of new staff (as discussed in the cost category descriptions for MS-1, MS-5, and MS-12), we will need to hire additional supervisors and support personnel. We forecast a need to hire an additional FSR supervisor in each of the 24 service centers in the metropolitan area. An additional Supervising Field Service Representative will be hired for each of the service centers to handle the rerouting of the remaining manual read accounts, oversee the distribution of work, and oversee the resolution of access issues. We also forecast that one administrative aide will be needed for each service center to handle customer contacts, arrange customer appointments and handle administrative personnel-related activities. We also expect to hire three project support personnel to assist with deployment tracking and reporting for all of our service centers in the metropolitan and rural areas. Finally, we expect to add one supervisor and one project manager to handle the new revenue protection investigators that will be hired (as discussed in cost code MS-12). TDBU also requires one additional FTE in the rural districts. We estimate the cost of these 78 incremental employees at $25.2 million over the 2006 to 2010 deployment timeframe.

c) Cost of Purchasing Meters (MS-3)

Based on vendors' RFI responses, our preliminary estimate is that we will procure approximately 6.7 million meters at a cost of $431 million over the 2006 to 2021 timeframe resulting from the initial AMI deployment, replacing meter failures, and addressing customer growth. We will procure four different meter types for the AMI deployment. Each meter will be equipped with an RFID tag to facilitate our procurement and supply chain processes. The RFID tag adds $2 per meter to the cost. Sales tax was included in our estimated meter cost.

To achieve the 90 percent coverage required by the July 21, 2004 Ruling, we will procure 4.5 million meters to replace the existing meters throughout our service territory. Table 3-8 shows the types of meters, quantities, and unit costs associated with full deployment.

Table 3-8
Cost Table for Initial AMI Full Deployment
Meter Purchases

Meter Type With Communication Module	Meter Quantity	Base Unit Cost
< 20 kW residential single phase	4,112,000	$52
< 20 kW network	117,000	$132
< 20 kW 3 phase commercial and residential	182,000	$322
> 20 kW commercial	129,000	$702
TOTAL	4,540,000	N/A

We will also incur meter equipment costs in addition to the AMI meter and RFID costs. We assume that each AMI meter will need to have a meter lock ring. We expect to be able to use 50 percent of the lock rings currently in place for the new AMI meters, however, these lock rings will need a new lock pin. Thus, we will need to procure new lock rings for 50 percent of the new AMI meters, and we will need to procure new lock

pins for the other 50 percent. Another additional cost we expect to incur is associated with replacing the current A-base meters. For these meters, we must install an adapter to enable the meter change.

Our preliminary analysis shows that during full deployment, we will have meters that fail after the three-year warranty period has expired. We estimate that there will be 962,000 meter failures during the 2009 to 2021 timeframe based on our projected failure rate.[21] In those cases, we will need to procure and install new AMI meters at these meter sites. Table 3-9 illustrates the meter type and expected volumes associated with replacing these failed meters.

Table 3-9
Meter Failures - Out of Warranty Only (Scenario 4)
(2009 Through 2021)

Meter Type With Communication Module	Quantity
< 20 kW residential single phase	871,000
< 20 kW network	25,000
< 20 kW 3 phase commercial and residential	39,000
> 20 kW commercial	27,000
TOTAL	962,000

In addition to installing AMI meters on existing meter sites, we will need to install AMI meters as we experience customer growth. We estimate approximately 1.2 million new meter sets during the 2006 to 2021 timeframe due to customer growth. Table 3-10 shows the expected meter type and volumes associated with these new meter sets.

[21] *See* Appendix C concerning how this failure rate was calculated.

Table 3-10 Cost Table for Projected Meter Growth (2006 Through 2021)	
Meter Type With Communication Module	**Quantity**
< 20 kW residential single phase	1,053,000
< 20 kW network	30,000
< 20 kW 3 phase commercial and residential	47,000
> 20 kW commercial	33,000
TOTAL	1,163,000

d) Installation and Testing Equipment Costs (MS-4)

Our analysis indicates that we will incur $24.5 million in installation and testing equipment costs during the 2006 to 2021 timeframe. With regard to installation equipment, over the 2006 to 2010 timeframe, we will incur costs for tools, equipment, materials, supplies, uniforms, and vehicles associated with the new installers, meter technicians, meter readers, field service representatives, supervisors, and various support personnel. These costs will continue over the 2011 to 2021 time period for the incremental personnel remaining following the installation period.

We will also incur facility costs over the 2006 to 2010 timeframe. Current SCE service center facilities cannot house the required incremental personnel. Facilities will either be modified to handle the incremental personnel or portable facilities will be leased.

In terms of meter testing equipment costs, we will incur costs to reconfigure our Meter Shop facility to handle the increased workload for the AMI deployment. Seven additional meter test workstations must be installed in the Meter Shop during the 2006 to 2007 timeframe. In addition, our material handling conveyer system needs to be upgraded because the existing conveyor will not accommodate

additional workstations. We will also need to acquire an additional demand testing board to handle the increased workload for commercial meters.

e) Installation Labor (MS-5)

(1) Residential and Small Commercial (<20 kW) Meters

In order to support the aggressive deployment schedule set forth in the July 21, 2004 Ruling, we estimate a need for 202 Project Temporary Installers during the 2006 to 2010 timeframe. We base this estimate on the assumption that an installer in our metropolitan areas will install 25 residential meters per day or 18 commercial/industrial meters per day.[22] The cost of additional personnel to perform these installations is estimated to be $55 million over the 2006 to 2010 timeframe.

(2) Complex Meters

In our service territory, we have approximately 275,000 meters that are considered complex and installations will, therefore, be handled by Meter Technicians. Given the aggressive deployment schedule required by the July 21, 2004 Ruling, we will rely on both full-time resources and contract resources. Beginning in 2006, we will dedicate 87 Meter Technicians to full deployment. As the five-year deployment period progresses, we will decrease resources dedicated to the project. These resources will also need to work overtime in order to meet the annual installation targets. We have estimated that the overtime to be worked is equivalent to between 13 and 30 incremental full-time employees throughout the 2006 to 2010 timeframe. Our personnel estimates are based upon the assumption that a Meter Technician can install an AMI meter in 2.5 hours on average. The cost for the additional personnel is estimated to be $32.0 million over the 2006 to 2010 timeframe.

[22] Installation rates for the 104,256 meters covered by the rural installers are different because of the vast difference in geographic locations between meters. We estimate that rural installers will install 20 residential meters per day and five commercial/industrial meters per day.

We expect to employ outside contractors to assist with the installations beginning in 2007. The number of contractors will vary by year, ranging from 12 contractors in 2007 to 22 contractors in 2009. The costs associated with the contract employees are $4.6 million over the 2007 to 2010 timeframe.

f) Meter Installation Tracking System (MS-6)

We expect there will be meter failures that occur throughout the deployment period. We plan to hire additional analysts as necessary to assist with tracking the meter failures. The analysts will look for trends in the failure data so that we can resolve communication or product issues with the vendor. We estimate the cost for this additional activity at approximately $0.61 million for the period 2006 through 2010.

g) Panel Reconfiguration/Replacement (MS-7)

When we replace A-base meters during the course of deployment, we will need to install a socket adaptor in the panel. This socket adaptor allows the new AMI meter to be "plugged" into a customer's older electrical panel. We assume that fewer than two percent of all meter changes in any given year will be A-base meters requiring the socket adaptor. In addition, during the installation process, our installers may inadvertently damage the customer's meter panel. Although the meter panel is the customer's responsibility, we intend to pay the costs for any damages that occur to the panel while we perform the installation work. Based on our experience installing over 350,000 AMR meters, we incurred approximately $50,000 in damages associated with customer panels. For purposes of this business case analysis, we relied on this experience to develop a per meter damage cost of $0.14. Accordingly, the costs associated with panel reconfiguration/replacement are estimated to be $2.1 million over the 2006 to 2010 timeframe.

h) Potential Customer Claims (MS-8)

We expect to incur costs related to potential customer claims as a result of the AMI deployment. However, for purposes of this analysis, these costs have been reflected as part of the cost estimate for cost code MS-7 given that we were not able to delineate the customer claim-related portion of the costs.

i) Salvage/Disposal of Removed Meters (MS-9)

As installers remove non-AMI meters, they will return these meters to the service centers. We plan to contract with a salvage company to handle removing these meters from each of our service centers. As such, we have not assumed any incremental costs to handle these meters.

Throughout the meter deployment period, we anticipate that there will be meter failures in the field. Once the installer returns the meter to the service center, the meters that are still under warranty will be returned to the vendor for replacement. We will require additional personnel to handle the processing of meters returned to the vendor. Over the 2006 to 2010 deployment period, we estimate $0.63 million in labor costs for this activity.

j) Supply Chain Management (MS-10)

As discussed in Section III of this volume, our PAMM group is responsible for receiving and stocking meters at our central distribution facility. We expect to add more personnel to handle the increased volume of meters that will be received and processed in the central distribution facility. During the 2006 to 2010 deployment period, we estimate the need for nine material handlers responsible for receiving the meters from delivery trucks, storing the meters within the warehouse, and staging the meters for distribution. We also forecast the need for three warehouse clerks to maintain the integrity of the inventory by processing receipts, conducting inventories, and tracking assets. We will need two heavy-transportation drivers to deliver new AMI

meters to our Meter Shop for testing and then out to the various SCE service centers for installation. Further, we anticipate the need for additional supervisory and project support personnel. Throughout the 2011 to 2021 time period, we will maintain additional personnel to process the meter failures in the field. This processing includes sorting, packaging, and shipping the meters back to the supplier, as well as receiving and tracking the meters when they are returned. We estimate the cost for the additional personnel at $7.9 million over the 2006 to 2021 timeframe.

Currently, our central distribution facility is at 95 percent capacity, housing and maintaining a monthly average of 25,000 meters. With full AMI deployment, we expect to increase our meter inventory to 100,000 meters monthly. A new facility will be required to house the meter inventory because our current facility cannot accommodate the volume of meters required for this deployment.[23] Given the forecast monthly meter volumes, we expect to maintain this facility until mid-2011. Other non-labor costs that we will incur from 2006 to 2021 are for miscellaneous equipment, packing supplies, and freight costs for delivering materials to the service centers on a just-in-time basis. Thus, estimated non-labor cost is $8.0 million over the 2006 to 2021 timeframe.

As meters are delivered to various service centers, additional personnel are required to process the meters at the service center locations. This processing includes verifying receipt of the meter, scanning them into the Field Tracking tool, and resolving variances in expected versus actual deliveries. We estimate the need for 15 additional employees to handle these activities at an estimated cost of $5.2 million over the 2006 to 2010 timeframe.

[23] The start-up costs for a new facility are detailed below in cost category MS-11.

k) Training (Meter Installers, Handlers and Shippers) (MS-11)

For employee training needs, we looked at both the trainee-related cost of non-productive (seat) time spent in the classroom, as well as the cost of the trainer and training staff. Depending upon an employee's position, they will have to take training classes, ranging from new hire meter reading classes to meter installation classes. We estimate that the seat time costs for our field personnel will be $4.8 million over the 2006 to 2010 timeframe. The cost associated with developing and delivering materials for these training classes is estimated to cost $1.0 million over the 2006 to 2007 timeframe.

It is expected that most of the PAMM employees assigned to the AMI project will be new hires and will require training in all aspects of logistics including but not limited to: safety, systems, equipment, procedures and processes. Our PAMM Organization estimates training costs of approximately $426,000. As mentioned in cost code MS-10, our current central distribution facility is at 95 percent capacity and a new facility will be needed to house the meter inventory. In addition to the actual facility leasing costs, we will incur equipment and supply costs to connect the new facility with our existing communications network. We estimate that we will incur approximately $484,000 in 2006 to make this facility operational.

l) Maintaining Existing Metering Systems (MS-12)

As meter failures occur throughout the deployment period, replacement meters will need to be installed. FSRs will handle this work. We estimate the need to hire additional FSRs beginning in 2006 to support the meter replacement activities. Our personnel estimates include costs for 3.1 FTEs in 2006, increasing to 28.8 FTEs in 2007, and then decreasing to 15.4 FTEs in 2010. From 2011 to 2021, FTEs increase by 17 supervisor positions to reach a steady level of 32.5 FTEs. These new supervisor positions added in 2011 are a higher classification of supervisor due to the increased responsibilities of supervising a combined work force of 20 percent meter

readers and 75 percent FSRs. In 2010, all 32 lower level supervisors are reduced in MS-1. Our personnel estimates are based upon a replacement rate of 25 residential meters per day and 18 commercial/industrial meters per day.

Throughout the full deployment of AMI, we expect that our installers may discover potential energy theft situations that need further investigation. This assumption is based upon our experience with the van-based AMR deployment. We plan to hire additional revenue protection investigators responsible for investigating these potential theft situations. With the increased potential for identification of possible theft, we expect to increase our current investigator staff from 16 to 32 investigators by 2007.

Currently, potential energy theft situations are usually brought to our attention by our meter reading staff. Given that a majority of the meter reading staff will be eliminated with AMI, we will hire three additional support personnel to analyze meter data to identify potential theft situations to be further investigated.

The labor costs for incremental FSRs, revenue protection investigators and associated support personnel are estimated at $37.9 million for the 2006 to 2021 timeframe. In addition to labor costs, we will also incur equipment costs of approximately $4.7 million for the same period for tools, equipment, materials, supplies, uniforms, and vehicle costs associated with the new FSRs, revenue protection investigators and support personnel.

Additional non-labor costs are forecast for battery replacements in the AMI meters installed on the greater than 20 kW commercial accounts. Those meters contain a battery with a 10-year life. In 2016, we will begin the process of replacing these batteries and the replacement process will continue through 2021. We estimate the cost of the replacement batteries at $0.40 million.

As the AMI system is deployed, we anticipate new issues will develop from the implementation of new systems and the large number of meter changes. These will impact our ability to prepare and deliver accurate customer bills in a timely manner.

We estimate the need for one FTE per year for project support to resolve AMI issues affecting billing. The estimated cost of this activity is $1.3 million over the 2006 to 2021 timeframe.

m) Pick-up Reads (MS-13)

When a meter fails, the failure can be attributed to either a registration issue or a communication issue. In either case, it will be necessary to send a Meter Reader to collect a pick-up read from that meter in order to maintain timely and accurate customer billing. We estimate that we will need to hire additional Meter Readers beginning in 2006 for such pick-up reads. Our personnel estimates increase in 2007 once the communication network is operational and we start experiencing both registration and communication failures with the AMI meters. Our personnel estimates include costs for 1.3 FTEs in 2006, peaking at 18 FTEs in 2007, and reaching a steady state of 6.7 FTEs from 2011 to 2021. These estimates are based upon a pick-up read rate of 56 reads per day. The labor costs for this cost code are estimated to be $6.0 million over the 2006 to 2021 timeframe. Non-labor costs of $0.8 million will be incurred for tools, equipment, materials, supplies, uniforms and vehicle costs associated with these new Meter Readers.

n) Meter Replacement Costs (MS-14)

As we described in cost code MS-12, we will need to replace the batteries for the AMI meters that are installed on the greater than 20 kW commercial accounts. The labor costs to perform this battery replacement are captured in cost code MS-14. Our estimates of $2.8 million include costs for 12 FTEs in 2016, peaking at 20 FTEs in 2020, and tapering off to 2 FTEs in 2021.

2. Communications System

a) Review/Specify Security System (C-1)

As we design our new communications infrastructure, it will be necessary to assess the systems needed to ensure the security of the data transmitted

within the network. We plan to engage contractor resources to assist us with this assessment. The costs for this assessment will be incurred in 2006 and are estimated to be $72,800 in 2004 PV dollars.

To ensure the accurate transmission of data from the meter to the billing systems, we will dedicate personnel to review the operational design and system requirements. We estimate the need for additional personnel for these activities from 2006 to 2008 timeframe at a cost of $0.58 million.

b) Network Placement Site Surveys (C-2)

There are no incremental costs associated with this cost category.

c) Mapping Network Equipment on Company Facilities (C-3)

We will incur incremental labor costs during the 2006 to 2007 installation timeframe necessary to map MCC take-out point installations. Engineers will need to determine appropriate placement of the 181 MCC take-out points within SCE's service territory. Once the MCC take-out point locations have been identified by the engineers, communication technicians will be responsible for installing the equipment. The labor costs associated with replacing failed MCC take-out points are also included in the estimate for this cost category. Overall, we estimate the labor costs for these activities at $1.26 million.

We plan to utilize contract personnel to handle the installation of the collectors, packet routers and the antennas for the MCC take-out points throughout the entire deployment period. The contract personnel will handle the replacement of any failed equipment as well. Contract personnel will also be utilized during the battery change-out process, which is described in more detail below. The contractor labor and vehicle costs associated with these activities are $5.0 million.

d) Staging Facilities for WAN/LAN Equipment and Mounting Hardware (C-4)

For the communications infrastructure, we will configure and test 100 percent of the network infrastructure equipment before it is deployed to the field for installation. The labor costs associated with performing these activities on 9,600 collectors, 96 packet routers, and 181 MCC take-out points are estimated at approximately $0.96 million for the 2006 to 2010 deployment period.

In terms of maintaining the communications infrastructure, we currently do not have a facility that can accommodate the 85 FTEs needed to maintain the communications network (these personnel costs are further described in cost category I-15) below. Our cost estimates includes the lease costs for a new facility which will continue over the 2006 to 2021 time period. In 2006, we will incur facility set-up charges such as costs to connect the new facility to our existing communications network. Overall, the costs associated with this facility are estimated at $3.5 million over the 2006 to 2021 timeframe.

e) Review/Develop Strategies to Retrieve/Process Data from Meters (C-5)

In determining the appropriate strategies for retrieving and processing meter data, we evaluated IT application solutions. Given the data retrieval and processing requirements associated with AMI, we developed new applications or, in some cases, enhanced existing applications to handle these requirements. Section III above, details the various IT application solutions that need to be developed or enhanced in the areas of meter supply chain management, meter change workflow and meter read conversion. We have estimated approximately $0.37 million in contractor costs associated with the IT application solution design.

Our Billing and IT organizations will work jointly to determine the system requirements needed to prepare and deliver accurate bills in a timely manner

based on data retrieval from AMI meters. We estimate $1.99 million in project management and business analyst support labor costs for these activities.

f) Auxiliary Equipment (C-6)

Our analysis indicates that we will incur $4.4 million in auxiliary IT equipment costs over the 2006 to 2021 timeframe. With regard to the communications infrastructure, auxiliary equipment for the MCC take-out points and collectors is required in order to make the infrastructure operational. For the 181 MCC take-out points, antennas and various other pieces of equipment will need to be installed on each unit. Each of the 9,600 collectors will be equipped with a battery, which is estimated to have a six-year life. This battery is required so that data is not lost in the event of a power failure. Beginning in 2012, we will need to begin changing the batteries in the collectors. In order to minimize installation error, we will provide the contractor personnel handling the equipment in the field with refurbished equipment that allows them to avoid changing the batteries in the field. In 2012, we will purchase 100 new collectors to begin this battery replacement process. The collectors that are removed from the network will be retrofitted with the new batteries and then redeployed to the field.

For the AMI meter installations, there will be a subset of meters that require an external antenna installation so that the meter can communicate properly with SCE's network. We assumed in our preliminary analysis that, based on information from the RFI response, one percent of all residential and less than 20 kW commercial meter installations will require an external antenna. For greater than 20 kW commercial meter installations, we estimate that 20 percent of the installed meters will require an external antenna. This assumption is based upon our experience with the RTEM Project. The majority of the antenna costs will be incurred during the initial deployment period in the 2006 to 2010 timeframe. However, the costs will continue through 2021 to reflect antenna

costs associated with the loss of communication due to RF interference. Overall, we estimate the cost at $7.8 million over the 2006 to 2021 timeframe.

g) Pole Replacement (C-7)

We do not forecast any pole replacement requirements to support full deployment and thus we do not estimate any costs for this cost code.

h) Communications Link from Meters to Data Center; WAN/LAN Service (C-8)

We do not forecast any incremental costs for this cost code.

i) Install Cross Arms/Mounting (C-9)

We do not forecast any incremental costs for this cost code.

j) Purchase Network Communication Equipment and Hardware (C-10)

Over the five-year deployment period, we plan to install 9,600 collectors. The majority of the installations will be complete by July 2007, at which time the network will become operational. Once the RF networks are operational, we will be able to determine the specific areas within our service territory that are not communicating with the network and determine whether a collector can be deployed to cover that location or whether it will be a RF "blind spot," and will not possess remote read capability. We also plan to install 96 packet routers. We will need to install packet routers to ease congestion on the network and enable data to be transmitted to the network in a timely manner. Equipment costs for the 181 MCC take-out points are also included in this cost code. Each MCC take-out point will need to have four radios installed to make the unit operational.[24] Overall, the estimated costs for the network communication equipment are $13.8 million.

[24] Other equipment is also needed to make the MCC take-out point operational. The costs associated with this equipment are discussed above in cost code C-6.

Table 3-11 describes the annual deployment volumes associated with the communication infrastructure.

Table 3-11
Communications Infrastructure Deployment Volumes

Equipment	2006	2007	2008	2009	2010
Collectors	5,333	2,902	455	455	455
Packet Routers	62	34	0	0	0
MCCs	120	61	0	0	0

Throughout the course of the full AMI deployment, we expect equipment failures to occur. These failures will require us to incur additional labor and material costs to replace this failed equipment. Based on information from the RFI response, we assumed an annual equipment failure rate of one-half of one percent in our preliminary analysis.

As meters are installed, the installers and meter technicians will utilize an RF tool to verify that the communication module is functioning properly. We will also procure LAN assessment tools to help troubleshoot problems when we determine meters are not communicating with the network. We estimate costs for procuring this equipment in 2006 at $0.23 million.

k) WAN/LAN Training (C-11)

We do not forecast any incremental costs for this cost code.

l) Cost of Attaching Communication Concentrators (C-12)

Non-labor costs of $49,700 are included in this cost code for various development tools, licenses, and fees.

m) Contracts to Retrieve Meter Data (C-13)

We do not forecast the need for contracts to retrieve the meter data and services and have not forecast any incremental costs for this cost code.

n) Dispatch and O&M of Field WAN/LAN and Infrastructure Equipment (C-14)

We do not forecast any incremental costs for this cost code because there are no dispatch and O&M costs associated with infrastructure equipment.

o) Electric Power for LAN/WAN Equipment and/or Meter Modules (C-15)

We do not forecast any incremental costs for this cost code.

3. Information Technology and Application

a) Network Planning/Engineering (I-1)

As discussed above, we will install a communications infrastructure comprised of collectors, MCC take-out points, and packet routers. Thus, we expect to incur incremental labor costs of $2.8 million over the 2006 to 2010 period in this cost code for the engineers and project support staff to design this infrastructure.

b) Computer System Set-up (I-2)

Full deployment of AMI will require us to enhance our computing systems through the development of new applications and the enhancement of existing applications. To accommodate these changes to our computing infrastructure, new hardware and operating systems, including 134 servers and 2,965 Gb storage, will be required. Because we plan to use the RFID technology in our supply chain management activities, we will need to acquire equipment to make this technology operational. The equipment we will procure includes dock door portals, barcode readers, hand-held readers and laptops. Additionally, we expect to automate the asset tracking and work order aspects of the meter installation and removal processes. This will require us to upgrade existing field laptops and provide additional laptops with GPS capability for the installers.

Given the data processing requirements associated with interval usage data, we will also need to increase the mainframe resources by 1,025 MIPS and 1,379 Gb in additional storage.

Another major cost driver in this cost category is related to customer bill printing. As new rate schedules are introduced to facilitate customers' demand response, we are expecting that the number of pages of our customer bill will increase from four to six. In order to control our postage cost increases, we will need to maintain the current number of pages by printing on both the front and back of the bill stock. Our current printers do not accommodate printing bills in this manner. As such, new duplex printers will be required to process these new six-page bills.

In Scenario 4, to facilitate demand response, we will be posting customers' usage data on SCE.com, as discussed in further detail below. Upgrades will need to be made to the SCE.com servers in order to accommodate additional customers accessing our webpage.

Incremental SCE FTEs and contractor resources will be required to handle the design and installation of the new hardware. We estimate the costs for computing systems set-up and associated labor at $43.5 million.

c) Data Center Facilities (I-3)

As discussed in cost code I-2, we will be procuring duplex printers. Due to the size of the duplex printers, we will need to incur additional charges related to facility modifications. Non-labor costs of $92,500 are being charged to this cost code in 2006.

d) Develop/Process Rates in CIS (I-4)

Full AMI deployment will require us to develop new applications and enhancements to existing applications to properly support processes such as meter supply chain management, meter change workflow, and meter read conversion processes. A

critical element of this effort will involve verifying that the new application or enhancement does not adversely affect existing systems that process meter changes and meter reads and calculate bills. We plan to use various comprehensive (and generally accepted) testing techniques, such as regression, integration, unit, and system testing. We will engage contractor resources to handle these testing activities during 2006. We estimate the cost for these activities at approximately $0.22 million.

e) New Information Management Software Applications (I-5)

Full AMI deployment will require us to automate the procurement processes in our Meter Supply Chain System. Analysis for this cost code assumes that the Meter Supply Chain automation project described in the 2006 GRC is deemed reasonable and receives cost recovery.[25]

The major drivers for the Meter Supply Chain System changes include: supply chain software enhancements and configuration for meter procurement process; support for RFID additional software enhancements related to tracking meter volume and deployment schedule; and integration with other systems in the meter deployment workflow. The Meter Supply Chain System proposed in our 2006 GRC will also need to be reconfigured to enable the "embedded" modules to support the procurement processes for the AMI meter. Additionally, these enabled modules will require integration with several other procurement management-related systems, including vendor management, asset management, and financial management systems to create a highly automated system to support the end-to-end meter supply chain business process from meter vendor to field installation. Overall we estimate that the system reconfiguration and the related system changes will cost $12.5 million over the 2006 to 2021 timeframe.

[25] *See* SCE's 2006 GRC Application (A.04-012-014) submitted on December 21, 2004.

f) Records (I-6)

We expect that new applications will be developed and existing applications will be enhanced to support automating the meter change workflow and meter read conversion processes to accommodate the meter change volumes. Additional applications will be developed and enhanced in Scenario 4, including Usage Calculation, Service Billing and SCE.com. The costs associated with developing the system requirements and database schema are captured in this cost code.

Application development and enhancement is primarily performed by contractor resources. We estimate the cost for these activities at $0.53 million over the 2006 to 2007 timeframe.

g) Update Work Management Interface to Process Additional Meter Changes (I-7)

Another critical element of system enhancement and development is designing interfaces between the various systems and verifying that they are working as designed to ensure that information flows appropriately. We will engage contractor resources to handle these activities during 2006. We estimate the cost for these activities at approximately $29,800.

h) Maintain Existing Hardware/Software that Translate Meter Reads into Bills (I-8)

Our Billing and IT organizations will work jointly to determine system requirements needed to gather usage data and translate it into billing data. Once system requirements are identified, these organizations will assist in the testing of new software. We estimate $1.3 million in project management and business analyst support labor costs for these activities over 2006.

As detailed in the description for cost code I-7, we will engage contractor resources to handle interface design and verification activities during 2006. For

cost code I-8, we expect to use contractor resources as well and estimate the cost for these activities at $177,400.

i) Process Bill Determinant Data (I-9)

In Scenario 4, the introduction of demand response rates will significantly increase the amount of usage data that is collected and processed. Instead of having one read and one time stamp per month for each account, we will have 730 reads and 730 time stamps per month. With this volume of data, we expect there will be additional usage validation failures. As such, we will need additional customer service representatives to manually process the accounts that the system is unable to process. Our personnel estimates include costs for 41.7 FTEs in 2008, tapering off to 12.3 FTEs for the 2014 to 2021 timeframe. Given the significant increase in personnel, our labor cost estimate is $16.8 million and non-labor is expected to be $1.1 million.

In terms of our IT systems, we will also need to dedicate resources to defining additional rules that will determine whether data is processed by the system or whether it needs to be reviewed manually by a customer service representative. We will engage contractor resources to handle these activities during the 2006 to 2007 timeframe. We estimate the cost for these activities will be $505,000.

j) Contract Administration and Database Management (I-10)

We do not forecast any incremental contract administration costs for this cost code. The incremental costs for infrastructure database management are included in cost code I-16.

k) Exception Processing (I-11)

As meter failures occur, we expect that these accounts will fail billing system validations and will require manual intervention. This manual processing involves determining how a bill will be processed when a meter failure occurs during the middle of a billing period. Depending upon the nature of the meter failure, judgment is

often required to estimate usage. Of the total meter failures, we estimate that 50 percent will require manual processing. Thus, additional customer service representatives will be needed to manually process these accounts so that customers continue to receive timely and accurate bills. Our estimates for this cost code include costs for 12.5 FTEs in 2006, peaking at 22.3 FTEs in 2008, and tapering off to 2.0 FTEs by 2011. The estimated cost of $6.5 million over the 2006 to 2021 timeframe for this cost code is based on processing five accounts per hour for the first three years. As employees become familiar with how to handle these accounts, we expect their productivity to increase to 10 accounts per hour, beginning in 2009.

In terms of our IT systems, we will need to dedicate personnel to define and develop the process to handle exceptions. We will engage contractor resources to handle these activities during 2006. The estimated cost of these activities is $97,700.

l) License/O&M Software Fees (I-12)

Software licenses are required for the RFID technology solution incorporated in the meter supply chain management system. The estimates in this cost code include an initial software license fee and aggregate ongoing license fees of $3.9 million during 2006 to 2021.

m) Ongoing Data Storage/Handling (I-13)

The incremental costs associated with ongoing data storage/handling have been captured in the estimates for cost code I-16.

n) Ongoing IT Systems (I-14)

As previously discussed throughout this section, full AMI deployment will require us to develop new applications and enhance existing applications to facilitate the meter supply chain management, meter change workflow, and meter read conversion processes. The ongoing O&M costs for these applications include applications support, security administration, database administration support, and maintenance and

enhancement activities associated with the portfolio of applications that have been developed or enhanced to support AMI. The costs in this category are comprised of both contract and SCE labor. We estimate the costs for the activities in this cost code at $13.5 million during the 2006 to 2021 timeframe.

o) Operating Costs (I-15)

The fully operational communications infrastructure will contain 168,000 commercial meters with radios, 9,600 collectors, 96 packet routers, and 181 MCC take-out points. As the infrastructure develops during the deployment period and beyond, we will need to phase-in additional personnel to handle the on-going management of this network. By 2010, we estimate that we will need 85 incremental personnel. We will utilize a mixture of full-time personnel and contractor resources to meet this need. Based upon our current experience with managing the network, we assume that we will need 20 engineers and IT specialists for every 40,000 radios. We forecast the incremental SCE labor costs from 2006 to 2021 at $42.3 million and the incremental contractor costs from 2006 to 2021 at $12.4 million.

p) Server Replacements (I-16)

We assume that the computing systems hardware identified in cost code I-2 will be refreshed on a five-year technology refresh cycle. For purposes of this business case analysis, a hardware refresh would occur in 2011 and again in 2016. We did not include a final refresh in 2021 based on our assumption that the entire AMI system will be obsolete and need to be renewed with new technology and supporting infrastructure. The design and installation of the new hardware will be handled by contractor and incremental SCE resources, the costs of which are included in this cost code. Incremental SCE labor costs for database management are also included in this cost code. We estimate the costs for refreshing the computing systems and associated labor at $47.1 million.

4. Customer Service Systems

This section describes the Customer Services Systems related cost codes utilized in assigning costs for the full AMI deployment scenario. Call Center, Meter Order Processing, Customer Communications and a portion of Billing-related costs are included in this cost category.[26] This section will not include meter reading and field services costs, because these functions are essential to the Meter System Installation and Maintenance costs as previously discussed in this volume.

a) Start-up and Design

Appendix A of the July 21, 2004 Ruling did not identify any "start-up and design" related costs in the Customer Service Systems categories. We have, however identified some billing related "start-up" costs. This includes the need for approximately 1.65 FTEs in 2006, going up to 3.16 FTEs in 2008 as the full deployment scenario reaches its peak installation phase. These billing related start-up costs are associated with the specification of security systems, the development of data retrieval strategies, network planning, and the meter RFP proposal specifications. These costs are included under cost codes C-1, C-5, I-1, and M-2.

b) Customer Records, Billing and Collections Work Associated with Roll-out of the Meter Change Process (CU-1)

The majority of costs in this cost code relate to the processing of meter orders. Meter order processing costs are based entirely on the volume of anticipated meter change orders in excess of those that would normally be processed in the Business As Usual case (see Appendix G). These costs are driven by routine change orders that fail to process initially in the automated meter processing system and must be manually

[26] The majority of our billing system installation and operating costs are included in the Information Technology section because cost codes I-9 and I-11 better described the billing related functions of "validating and creating billing determinate data" and "Exception Processing."

reviewed as an exception and reprocessed. This is a labor intensive process that is estimated to cost $14.8 million through 2021.

We anticipate a need for additional Billing organization personnel to support the revenue protection activities. As discussed in cost code MS-12, we expect our installers to discover potential energy theft situations that need to be investigated during the deployment process. Our Billing Organization will contribute to the resolution of these potential energy theft situations by performing analysis, interfacing with the field personnel, potentially rebilling customers' accounts, and corresponding with customers. We estimate approximately $1.8 million in labor costs for these activities over the 2006 to 2021 timeframe.

c) Increased Call Center Activity During Installation Phase of the Full Deployment Operational Case (CU-2)

Initially, we expect a relatively small volume of calls to result from mass market media messages introducing the meter change to the affected customers. This estimate is based on prior experience with similar communications campaigns. We expect a slightly larger volume of calls to occur as a result of the initial "meter change letter" that will be sent to all affected customers during the installation phase. We estimate that three percent of customers will call if only a letter or bill insert is sent and four percent if door hangers are left after service is complete.

The introduction of TDR schedules to facilitate customers' demand response will lead to additional call volume. We anticipate rolling out TDR schedules in the following manner. First, we will send customers information notifying them that their rate will be changed to a CPP rate schedule. We estimate that five percent of customers will call when notified that their rate is being changed. The five percent estimate is based on our experience with other communications in which rate modifications are included. Second, there will be customer calls related to opting out of the new rate. Our estimates

assume 27 percent of customers call about opting out and 70 percent of those that call will actually choose to opt-out. Overall, for this cost code we are expecting an increase of 850,000 calls per year during the installation phase of the project. This results in a total Call Center cost increase of $14.4 million over our business as usual costs.

Because we expect some small percentage of these calls to the Call Center will result in additional meter order processing, $183,000 in total cost has been added to this cost code to provide for these changes.

d) Modification and Customer Support Costs for AMI Integration to the Outage Management Systems (CU-3)

SCE's Outage Management System (OMS) is expected to function as it does today, entirely independent of the new AMI infrastructure. Other than some very minor IT costs ($169,000) we have not identified any other incremental implementation costs related to OMS for this cost code.

e) Process Meter Changes for New Meter Installation and DA Accounts (CU-4)

Our Meter Services Organization (MSO) costs for activities related to this cost code are expected to be $14.3 million. These activities include engineering and sample testing of meters prior to installation. The bulk of MSO metering installation work is classified as Meter System Installation costs in cost code MS-5. The Billing Organization has allocated approximately $2.6 million to the CU-4 cost code through 2010 for exception processing work directly related to meter changes during the installation phase. We did not forecast any billing costs in this cost code after the installations are completed in 2010.

f) Additional Rate Analysis Due to Multiple TOU Options (CU-5)

Even if no new rates were introduced under this scenario, we would expect an increase in on-going rate analysis work in our Billing Organization due to an

increase in the number of customer inquiries spurred by the large number of meter changes taking place. As CPP and RTP rates are introduced in Scenario 4, we expect to experience an additional increase in the number of customer requests for rate analysis. These requests are expected to affect not only our Billing Organization, but our Major Customer Division (MCD) as well. MCD provides coordination between account representatives and major customers for rate analysis opt-out and contract revisions. Customers who are deciding whether to opt out may want to request a rate analysis to determine if the rate assigned to them is the best rate for them. Customers who decide to opt-out of the rate may further request rate analysis to determine a more appropriate rate. The total increased cost for both Billing and MCD associated with these activities is expected to be $2.2 million in cost code CU-5.

g) Alternative Safety Measures and Reduced Customer Safety (CU-6 and CU-7)

Cost codes (CU-6 and CU-7) have to do with reduced customer safety and alternative safety measures, "because meter readers are no longer available." Although we recognize there is some foregone operational benefit in no longer having meter readers periodically inspecting our metering installations, we have no records relating to the frequency or value of our meter readers finding unsafe, or faulty electrical service equipment. Thus, we have not included any cost estimate in these two cost codes.

h) Customer Education of Rate Change (CU-8)

In Scenario 4, beginning in 2007, the Call Center expects to receive customer calls related to their first series of bills after changing rates. We projected that our customers would go through a learning curve period in which a declining percentage of customers would call after each bill is received after switching to the new rate. For Scenario 4, these rate-related calls are expected to increase call volume by 100,000 to 150,000 calls per year at an added cost in cost code CU-8 of $2.5 million. Web-based rate

communication costs are estimated at $0.4 million in this cost code. We will also incur some relatively minor costs of $0.1 million in cost category CU-8 related to developing materials for our customer account representatives and major customers.

i) Customer Support for Internet Based Usage Data Communications (CU-9)

We expect to receive approximately 10,000 additional calls annually from customers with questions related to their first review of usage data presented on SCE.com. As previously discussed, we projected that our customers would go through a learning curve period in which a declining percentage of customers would call after each session on SCE.com to review usage data. The total costs over the analysis period associated with these additional calls, which are charged to cost category CU-9, are estimated to be $212,000.

We also expect to incur costs related to the development of market research surveys to learn about customers' wants and needs so that the information learned can be applied to enhance the website. Costs will also be incurred related to assisting major customers in learning how to use the website and how to access their usage data. This will also provide support to the Customer Communications Organization by handling customer telephone calls regarding complex website related questions. The costs for these activities, which will be charged to cost code CU-9, are estimated to be $7.3 million. These web-based costs include the total cost of replacing the existing systems and we have identified over $4 million in offsetting benefits, which are included in benefit codes CB-8 and MB-1.

The increased use of internet usage data is also expected to result in additional Billing Organization costs of approximately $0.8 million.

j) Outbound Communications (Mass Media Costs, Print, Radio, TV) (CU-10)

The mass media Customer Communications programs related to this scenario are expected to cost a total of approximately $149.7 million. Another $64 million in Customer Communications and Marketing costs related to this scenario are, by definition included in cost code M-14 ("Customer Acquisition and marketing costs for new tariffs"). These will be described below in the "Management and Miscellaneous Other" cost category.

5. Management and Miscellaneous Other Costs

These cost codes include general overhead costs that span across two or more functional cost categories, such as project management and the administration of job skills training.

a) Buyout of Existing Itron Contract for Automatic Meter Reading (M-1)

In 1999 and 2000, SCE installed and implemented a large AMR program. This program included 350,000 meters equipped with electronic encoder/receiver/transmitters (ERTs), which provide the means to read meters automatically from a van being driven past each meter location. The task of driving by each meter site on a monthly basis and collecting the metered data was outsourced to Itron under the terms of a 10-year contract, which will expire in 2011. For purposes of this AMI program analysis, the original $11 million capital cost of the van-based AMR program and the entire cost of the 11-year contract are considered to be "sunk costs." This means none of this investment, including the contractual commitment, can be recovered other than by having Itron serve out the terms of the contract. Because we are already reading these meters automatically, we expect no incremental operational benefit will be derived from including these existing AMR meters in the AMI program. Because Itron actually owns the ERT component of these AMR meters, a significant part of the annual

contract cost goes toward Itron's own capital recovery and it is unlikely that Itron would forego future remuneration under this contract.

In Scenario 4, we would attempt to recover as much operational benefit as possible from the existing contract by leaving the AMR meters in place as long as possible and having Itron continue to read the ERT meters until the final phase of the AMI installations. Because we assume SCE will need to pay any remaining contractual obligation to Itron in order to complete the contractual commitment, no change in cost has been assumed in this analysis for reaching such a settlement in the final year or two of the contract.

b) Meter RFP Process and Contract Finalization and Administration (M-2)

The development and review phases of the RFP process are expected to involve the participation of the major SCE departments participating in the project. As a major participant in this process, the Billing Organization has included a portion of an FTE and about $63,000 to this cost code. All other participating organizations have included the costs associated with this process in the direct overhead costs associated with their respective start-up and installation cost estimates. The PAMM Organization costs related to the preparation and review of the RFP were included in cost code MS-10.

c) Customers' Access to Usage Information Through Communications Medium (M-3)

We expect to incur approximately $1.2 million in exception billing costs attributable to the increased availability of usage information to the customer.

d) Employee Communication and Change Management (M-4)

We have included approximately $308,000 through 2021 for the Billing Organization for this cost code. This estimate is for expected costs related to preparing and communicating project status information to Billing Organization employees and

keeping them informed and up-to-date on the implementation of AMI and its related systems. We estimated $104,000 in additional cost over the duration of the analysis period for web-related costs associated with general employee communications.

e) Employee Training (M-5 and M-10)

The M-5 cost code includes "systems and rate structures training." Training of Call Center personnel, meter readers, and meter test technicians is included in cost code M-10. There are two elements to employee training costs–the trainee related cost of non-productive (seat) time spent in the classroom and the cost of the trainer and training staff, including training materials, classroom preparation, etc. All "trainee" related costs are included in the operational costs of each individual operating organization. Most of the training will be provided by our Job Skills Training Organization (JST), whose costs are included here and under cost codes M-10 and MS-11. The Billing Organization and the Call Centers supplement the JST training with their in-department training as needed. Meter System installation training was included in the MS-11 cost code as discussed previously in this volume. The M-5 cost code includes "systems and rate structures training." Training of Call Center personnel, meter readers, and meter test technicians is included in cost code M-10.

In Scenario 4, we estimate there will be cost increases to develop and deliver training for all CSBU employees. CSBU employees include: Billing, Call Center, Credit and Payment Services, Field Services & Meter Reading (FSMRO), MSO, Major Customer Division (contact personnel and customers), and Rural Office personnel. Training will consist of communications, overviews, rates, processes, policies, and procedures related to AMI. Additional new-hire and enhancement training will be required for Billing, MSO (Meter Order Process), and FSMRO in support of AMI. Table 3-12 summarizes the estimated training costs related to implementation of the full deployment case.

Table 3-12 Training Costs by Cost Code (Full Deployment Costs in 2004 PV $)	
Cost Code	**Costs through 2021**
M-5 (Systems and Rate Structures)	$1.2 million
M-10 (Call Center, Meter Readers, Meter Techs.)	$2.1 million
MS-11 (Meter Installers, Handlers, Shippers)	$6.7 million
Total	$10 million

f) Meter Reader Reroute Administration (M-6)

The cost of recycling and rerouting meter reading for the 10 percent of meters that will not be read remotely through the AMI network has been accounted for in cost code MS-1, as discussed previously in this volume. These costs are being absorbed as a portion of the cost of the one additional supervising FSR assigned to each of the 24 districts to supervise the AMI meter system installation process.

g) Overall Project Management Costs (M-7)

Implementation of AMI will require the formation of a centralized Program Management Organization to be made up of management representatives from each of the key operational areas. The Program Management Organization will be responsible for the overall coordination required to assure that all program goals and objectives are met in a timely and cost effective manner. Throughout the installation phase of the project, the Program Management Organization will consist of eight middle management and two staff/analytical support personnel. In addition we anticipate the need for 18 external support (contract) personnel in the initial year, dropping down to 12 in 2007 through 2010. The estimated cost of the centralized Program Management Organization will be approximately $5.8 million initially in 2006, dropping down to $4.6 million by 2010 and leveling off at $450,000 in 2011 through the end of the project in 2021.

Program Management costs are expected to total approximately $19.8 million over the duration of the project.

In addition, each of the operating organizations has included the cost of their internal project management responsibilities in this cost code for a total of $15 million over the duration of the project. In total, we expect overall program and project management costs to be approximately $34.8 million through 2021.

h) Recruiting of Incremental Workers (M-8)

We expect that implementation of full AMI deployment will severely affect the recruiting and hiring process within the three most heavily impacted organizations, Meter Reading, Call Center, and Billing. For the most part, the incremental cost of recruiting the anticipated increase in personnel has been included in the cost estimates for each organization separately in their respective cost codes. Because of the initial start-up impacts on FSMRO personnel, that organization has included $225,000 in this cost code.

i) Supervision of Contracts and Technology Personnel Assigned to Hardware and Systems Development (M-9)

These costs are reflected within the individual operational areas. Accordingly, we did not forecast any additional costs under this cost code.

j) Training for Other Traditional Classifications (M-10)

As described above, the training costs included in this cost code are expected to be $2.1 million. This includes $.82 million in additional cost for specialized training in the Call Center to enable them to respond to the large anticipated call volume brought about by the opt-out provisions of the CPP default rate.

k) Work Management Tools (M-11)

Our Business As Usual operations, discussed in Appendix G, include the cost of providing our management with the most up-to-date work management tools

available. Thus, no incremental cost has been included for new or additional work management tools in this cost code for any of the AMI deployment scenarios.

l) Capital Financing Costs (M-12)

Capital and financing costs (M-12) are included in the NPV calculations at SCE's long-term weighted average cost of capital.

m) Cost of Increased Load During Mid-peak and Off-peak Periods (M-13)

There is no change in the cost associated with mid- and off-peak loads (M-13) under this scenario.

n) Customer Acquisition and Marketing Costs for New Tariffs (M-14)

Incremental customer acquisition and marketing costs in this cost code, combined with the marketing costs described in cost code CU-10 above, make up the total customer communications program. This cost code includes $64 million of the $214 million to be spent on customer acquisition and customer education programs that will be necessary to secure 80 percent of the AMI metered customers on a CPP rate, and keep them there for the duration of the analysis period.

o) Risk Contingencies (M-15)

The Energy Supply and Marketing Organization has included $2.3 million in added "risk management" cost for their Load Forecasting group to support the analysis and more complex modeling that will result from the availability of real-time data after AMI implementation. The group will query a 90 percent plus sample of real-time, prior-day load data from end-use customers on a daily basis. The data will require "cleaning" and comparison to prior month's settlement data to estimate the 100 percent bundled load per hour for the previous day. Additionally, to support trading, the Load Forecasting group will analyze the price versus usage patterns by hour and by month to account for how customers will respond to post AMI conditions (compared to current, non-AMI conditions) and use this analysis to adjust the forecast one to five days in the future.

Long-term forecasting will also be impacted by the availability of hourly/monthly sales data. Approximately $3.3 million in benefits expected to result from this process are discussed under benefit code SB-9.

Overall program contingency costs have been estimated at $64.5 million. Risk contingencies related to this scenario are discussed below.

B. Benefits

Table 3-13 summarizes the total estimated benefits we expect to result from the full deployment of AMI under Scenario 4.

Table 3-13
Summary of Benefits for Scenario 4
(2004 Pre-Tax Present Value Dollars)

Benefit Categories	Total
Systems Operations Benefits	$307,333
Customer Service Benefits	8,268
Management and Other Benefits	122,316
Demand Response Benefits	366,731
TOTAL:	$804,648

The following sections will describe only those benefit codes that were actually used in analysis of Scenario 4. Appendix H contains a discussion of all benefit codes identified in the July 21, 2004 Ruling, whether we actually included them in this analysis or not.

1. System Operations Benefits

In this section we will address the potential "system operations benefits" expected to result from full deployment of Scenario 4 to approximately 4.8 million SCE customers. Appendix A of the July 21, 2004 Ruling identified 13 such potential benefits that may occur. In our review of these potential benefits for Scenario 4, we have been able to quantify $307.3 million in savings, coming from only four of the 13 benefit code areas. We also expect some net benefit from one benefit code (SB-7), which we are not able to

quantify at this time. Eight of the potential areas of benefit identified in the July 21, 2004 Ruling are either already being experienced by SCE or have associated costs that more than offset the anticipated savings.

a) Reduction in Meter Readers, Management and Support (SB-1)

This is the single largest area of operational benefits expected to accrue from AMI. We currently employ approximately 570 meter readers and 80 management and support personnel, 80 percent of which would be eliminated with full deployment of AMI. Full deployment of AMI will result in our ability to automatically read 90 percent of all our meters. The remaining 10 percent, or approximately 470,000 meters, will continue to be read monthly by approximately 109 meter readers.[27] In addition, we expect to eliminate 16 of the existing meter reader supervisor positions with full deployment of AMI.[28]

The reduction of 80 percent of our current meter reading organization would result in a total savings of $271 million (expressed in 2004 present value dollars) over the duration of the analysis period. With our current attrition rate of 35 to 40 percent annually, the reduction of meter reading personnel is expected to take place through normal attrition during the latter phases of AMI deployment. Attrition is expected to ramp-up beginning with the actual activation of the AMI communications system (approximately 18 months after AMI installations begin) and continue throughout the deployment years. Severance of 32 supervisory personnel will result in a one-time cost of $3 million in 2010 ($1.9 million present value dollars). This severance cost is included

[27] The remaining 10 percent of the meters with which we are unable to communicate are scattered throughout the SCE territory and generally not adjacent to one another, thus making manual meter reading less efficient than it is today. Our assumption is that it will take 20 percent of the existing number of meter readers to read the last 10 percent of meters.

[28] These 16 supervisory positions are incremental based on the number of supervisory personnel required today, without AMI. The actual Reduction in Force (RIF) will require severance of 32 supervisors due to the temporary build-up of personnel to deploy AMI.

in cost code MS-1. Additional savings will result from the decommissioning of 80 percent of our hand-held meter reading devices. This savings is reflected in benefit code MB-1.

b) Field Service Savings (SB-2)

SCE currently completes nearly half of its "turn-off" and "turn-on" meter orders without having to actually turn the meter on or off. This situation occurs when a "turn-on" order can be matched to a "turn-off" order for the same location, on or about the same day. Such orders can be completed merely by taking a meter read, which currently requires a visit to the site at an average cost of approximately $15 per order. Virtually all of these special meter reads for matched on/off meter orders could be eliminated and replaced with the daily AMI meter read. This benefit would result in savings of approximately $29 million over the duration of the analysis period (*i.e.,* through 2021).

c) Phone Center Savings from Billing Inquiry Reductions Due to More Accurate Billing (SB-4)

Billing inquiries today are received for several reasons, only one of which is an inaccurate meter read. Based on a study using 2003 data, 22,791 calls to the Call Center were a result of meter reading errors. We used this number as a percentage of all calls to determine the percent of calls in subsequent years that would be projected as meter read error calls. For purposes of this preliminary analysis, we assume that 100% of these calls will be avoided with the full deployment of AMI.

Table 3-14 shows the number of avoided calls that may result from the complete elimination of meter reading errors. Using 3,376 as the average number of Billing Inquiry calls answered per FTE in the Billing Inquiry specialty support group in 2003, we are estimating a levelized reduction of seven FTEs by 2010, for a total benefit of $3.4 million through 2021.

Table 3-14 Reduced Phone Calls – Full Deployment					
Year	**2007**	**2008**	**2009**	**2010**	**2011**
Reduced Calls	8,445	14,089	19,753	23,626	23,626

Our Energy Supply and Marketing Organization has estimated $3.3 million in reduced resource acquisition costs in benefit code SB-9. This is the result of improved long- and short-term forecasting attributable to improved modeling and analytical techniques using AMI data.

2. Customer Service Benefits

The July 21, 2004 Ruling identified 13 Customer Service Benefits. This section will address our review and conclusions related to only those potential Customer Service Benefits that were actually used in our analysis. Appendix H discusses all 13 potential customer service benefit codes, whether we used them or not.

a) Improves Billing Accuracy – Provides Solution for Inaccessible/Difficult to Access Sites – Eliminates "Lock-Outs" (CB-1)

Inaccessible and/or locked meter sites are the primary reason for estimated and/or untimely bills. Automated retrieval of meter reads eliminates these meter access problems and reduces the need to estimate monthly meter reads. This, in turn, eliminates the need for many "pick-up" reads and billing inquiry investigations. We have estimated the savings related to this benefit to be approximately $5.4 million over the duration of the analysis period.

Additional related benefits in the Call Center have been identified under benefit code SB-4.

We have estimated $2.9 million in operational cost offsets to accommodate those customers who are already on demand response rates or who otherwise use the web-based programs for energy management information.

3. Management and Other Benefits

Only two of the 10 potential "Management and Other" benefit codes identified in the Ruling were actually used in SCE's analysis of Scenario 4. The following sections describe our review of each of the potential "Management and Other" benefit codes. The benefit codes that were not used are discussed in Appendix H.

a) Reduced Equipment and Equipment Maintenance Costs (Software Maintenance and System Support, Handheld Reading Devices, Uniforms, *etc.*) (MB-1)

In the full deployment scenario, we expect to reduce costs by approximately $2.9 million over the duration of the analysis period by decommissioning 80 percent of our hand-held meter reading devices. Typically these electronic devices would be replaced every five years. This is a cost that would no longer be incurred under full AMI deployment. We have also recognized $1.2 million in equipment replacement benefits resulting from upgrading the web-based systems and equipment.

b) Reduced Miscellaneous Support Expenses (Including Office Equipment and Supplies) (MB-2)

These savings have been included in the SB-1 benefit.

c) Reduced Meter Inventories/Inventory Management Expenses due to Expanded Uniformity (MB-4)

Electronic meters have a broader range of functionality than do their electromagnetic predecessors. This enables us to carry fewer meter types in inventory than was formerly the case. This benefit is already being utilized given that SCE has already started replacing all large customer meters and all time-of-use meters with RTEM or interval meters. This benefit is offset in large part by the higher failure rate of electronic meters compounded by their inherently shorter useful life, both of which result in higher inventory turn-over. The AMI system will introduce higher volumes of

inventories for communications equipment, and replacement parts than existed previously. For these reasons, we have not included any benefit value for reduced meter inventories.

This benefit code contains our avoided cost of purchasing approximately 72,000 conventional new and replacement meters each year for the full duration of the analysis period. As discussed in the Business As Usual case, the material cost of 72,000 new and replacement non-AMI meters each year is significantly different than the replacement cost of these same 72,000 meters each year using AMI meters.[29] For this reason, the total cost of all new and replacement AMI meters has been included in Scenario 4 in cost code MS-3. The avoided cost of not purchasing conventional meters for customer growth and routine replacements is included in this benefit code. For the full deployment scenario, this avoided cost is $118.2 million over the duration of the analysis period.

d) Summary Billing Cash Flow Benefits (Existing Customers) (MB-5)

SCE currently has approximately 418,000 individual service accounts being billed monthly on approximately 118,000 summary billing accounts (approximately 3.5 accounts per summary bill on average). Because the individual accounts are currently being read throughout the month, billing for the earlier read accounts is necessarily delayed until the last account is read, in order to bill all service accounts on the summary bill at the same time. This results in significant cash lag for these accounts. Theoretically, full deployment of AMI would allow us to synchronize the read dates for all service accounts on summary bills, virtually eliminating the current cash lag. The recent deployment of RTEM metering already provides the means to achieve a large part of this potential savings, since most of the cash lag is attributed to large customers over 200 kW.

[29] *See* Appendix G.

Full AMI deployment could result in some further savings to SCE, as most of our summary billed service accounts' meters become automated. Though there would be substantial benefit realized from rescheduling billing dates for the largest customers, there would be significant cost involved in making this change for all summary billed accounts and it is not clear at this time at what level of consumption this change would be cost effective. For this reason, we have not associated any savings with this benefit code.

e) Possible Reduction in "Idle Usage," Meter Watt Losses—At The Very Least, Quicker Resolution of Idle Usage Episodes (MB-6)

AMI meters have the ability to meter smaller loads (<25 watts) than do existing electromagnetic meters. Most electromagnetic meter discs sit "idle" when less than 20 to 25 watts are being consumed. Our review of our existing residential load survey data shows that some minimum load between 0 and 25 watts exists approximately three and a half percent of the time (*i.e.* approximately one hour per day on average). Though significant time-wise, the actual energy consumed during this unmetered hour is less than 0.004% of total metered kWh on average. For an average residential customer, this would equal approximately 25 watt-hours per month. On an annual basis, we estimate that under full deployment, all AMI meters would meter a total of approximately 1.4 million kWh per year (approximately $60,000 in energy costs) more than their electromagnetic predecessors. More accurate measurement of this energy would not result in any cost savings, but merely in a reallocation of these costs to those customers responsible for this currently unmetered load. Because the value of this unmetered load is so small, we have not included any savings attributable to this benefit in any of the scenarios.

The "watts lost" rating of an electronic meter is typically greater than that of the single phase electro-mechanical meter it would be replacing. We estimate the average AMI meter would be rated at approximately one watt higher than their single

phase electro-mechanical counterparts. For Scenario 4, this would add four megawatts of load 24 hours a day, 365 days per year. This would add over 35 million kWh per year in energy consumption.

An "idle usage episode" occurs when a routine meter reading results in some consumption being recorded for an account that is supposed to be turned-off (or "idle"). This situation occurs when a customer moves into a home or business and fails to notify SCE that they have turned the service on and have begun to use electricity. Typically, it can take 30 to 60 days to detect and investigate this occurrence and finally issue a bill to resolve the problem. Theoretically, with AMI metering, we expect such idle meter episodes can be detected 15 days sooner on average, resulting in a higher probability of obtaining compensation for the unauthorized use, and a reduction in revenue lag. In reality, most idle usage episodes resolve themselves within a matter of days of their occurrence and, as a practical matter, because of the service disconnect costs, exception bill processing, and other related costs of idle usage resolution, we do not attempt to notify the customer of a pending disconnect until a threshold of 400 aggregated kWh is exceeded. Identifying idle usage episodes in a timelier manner with AMI meters does little to remove these more practical processing cost considerations and any actual savings would be insignificant.

f) May Facilitate Ability to Obtain GPS Reads During Meter Deployment—Improving Franchise and Utility Tax Processes (MB-8)

GPS reads will be recorded for all meter locations during the installation phase of AMI deployment. This will be done to mark the actual location of the meter site, because it may be several years before we will ever have to revisit the meter. The GPS read will reduce the odds of physically "losing" the meter as customers add walls and fences, making it difficult to keep track of the meter and its access route. It is conceivable that these GPS reads can be incorporated into the Franchise Payment and

Utility User Tax processes, in order to assure more accurate processing of these fees. Because there would be offsetting costs to develop the systems interface to facilitate the use of GPS readings, a much more intense review of costs and benefits would have to be undertaken to determine the economic feasibility of this potential benefit.

g) Potential for Tax Savings from Federal Investment Tax Credits (MB-10)

We are not aware of any Federal Investment Tax Credits that would apply to AMI deployment under current law, and no such benefit has been included in any of the deployment scenarios.

C. Demand Response

This scenario assumes that 80 percent of eligible customers are defaulted to CPP-F rates (residential) or CPP-V rates (commercial <200 kW) and that those customers stay on those rates for the full duration of the business case. For purposes of our analysis, we assumed that customers opting-out of the default rate would either switch back to their tiered rate or choose a TOU rate in equal proportions. The demand response benefits for Scenario 4 are summarized below in Table 3-15. These benefits were calculated using the assumptions and methodology discussed in Appendix C.

Table 3-15
Scenario 4 - Demand Response Benefits Summary

	No. of Meters (Customers) Year 2021	Percent of Eligible Meters	Present Value Rulings Assumptions ($ millions)	Present Value SCE Assumptions ($ millions)
Meters Eligible for TDRs	4,835,650			
Customers Enrolled on CPP-F/V	3,868,520	80		
Customers Enrolled on TOU	483,565	10		
Customers Enrolled on Current	483,565	10		
Total DR-1 Benefits			$326	
Total DR-2 Benefits			$41	
Total DR Benefits			$367	$213

We have not adjusted the above demand response benefits for Value of Service Loss to customers due to participation in on the CPP and TOU rates. Our methodology and analysis of Value of Service Loss by scenario is presented in Appendix J. For this scenario, the Value of Service Loss is approximately $161.2 million (2004 present value dollars), reducing the total demand response benefit from $367 to $205.9 million.

D. Uncertainty and Risk Analysis

1. Operational Cost Uncertainty and Risk Analysis

We performed an operational cost and benefit risk assessment of this full deployment scenario based on the specific cost and benefit data discussed in the sections above. For analytical purposes, this operational cost risk assessment focuses on the 47 most significant cost codes that comprised over 85 percent of the overall cost. Once the appropriate cost codes were identified, we developed the most likely high and most likely

low ranges for each of the cost codes. We then applied a Monte Carlo statistical approach to create a probabilistic range around our estimate.

a) Significant Cost Areas

For this full deployment scenario, the total present value cost estimate (prior to adding contingencies) for full AMI deployment is $1.234 billion. In the discussion that follows, we will focus on five of the significant cost areas which represent over 60 percent of the total cost for this scenario.

(1) Cost Code MS-3 – Meter Purchasing

The most significant cost code (MS-3) in this full deployment scenario is estimated at over $400 million and involves the cost of meter purchases and the purchase of meter-related communications equipment. We estimated a range for this cost code to be plus 20 percent and minus 15 percent. The high end of this range is based on our historical experience with price differences that occur between an RFI and the ultimate final contract. We find that vendor price increases of as much 20 percent are due to better understanding of scope, warranty requirements, and contract terms and conditions. We based our estimate on vendor quotes we received in the RFI. The range also reflects the uncertainty of meter failure. The low range is based on the fact that current meter technology is aging, and potential vendors have informally indicated that lower prices are possible for high-volume orders.

(2) Billing

Under this full deployment scenario our Billing Organization estimate may vary by plus 20 percent to minus 15 percent depending on the number of exceptions processed.

(3) Meter and Field Communication

The meter and field communication installation costs may vary by as much as plus 15 percent to minus 20 percent based on installation productivity.

(4) Information Technology Computing Systems

Our information technology computing systems lifecycle costs have a range of plus or minus 40 percent due to the uncertainty of the data processing and storage required.

(5) Software Development

Our software development costs ranged plus 40 percent to minus 50 percent based on the uncertainty of the final design.

b) Monte Carlo Sensitivity Analysis Results

Using the cost ranges developed for the 47 most significant cost categories, the application of the Monte Carlo statistical analysis of costs resulted in a range of $1.195 billion to $1.343 billion around the estimated cost of $1.234 billion for this scenario. The statistical analysis indicates that our cost estimate has about a 13 percent confidence level. This means that the project has an 87 percent chance of overrunning. A 90 percent confidence level is reasonable for this type of project and the results of this analysis suggest that we should include contingency for this project.

c) Contingency

We determined that contingency should be applied to the start-up and installation activities. We also believe that a 90 percent confidence level is reasonable for this type of project. Based on the analysis results, we applied a contingency of $64.5 million across the start-up and installation phases in order to achieve this 90 percent confidence level.

2. Operational Benefit Uncertainty and Risk Analysis

The primary operational benefits of Scenario 4 relate to the reduction in meter readers and result in aggregate operational savings of $271 million. We do not expect any variation because the forecast reduction is solely a function of the AMI system

communication coverage that is designed to reach 90 percent of the meters. The other identified operational savings were less than the threshold we used for analytical purposes. As a result, we did not include any operational savings in the statistical analysis.

3. Demand Response Risk Analysis

We believe that Scenario 4 demand response results are implausible for a number of reasons. First, we believe that it is unlikely that CPP rates would be imposed on a quasi-voluntary (opt-out) basis on the mass-market without first testing customer acceptance of TOU rates on an opt-out enrollment basis.

Next, we believe that if default enrollment of CPP was implemented, it is highly unlikely that 80 percent of customers would adopt the CPP rate over the entire 16-year study period. The SPP found that four to six percent of customers chose to drop the CPP-F rate after the first year of the experiment despite an offering of incentive payments to continue participation in the program in 2004; and these were customers who volunteered (or opted-in) in the first place. Moreover, a shadow-bill analysis of SPP CPP-F customers found that 26.3 percent actually had higher bills than they would have if they had stayed on their otherwise applicable rate. Over time, customers who experience higher bills will likely opt out to a more favorable rate.

Another key, but unlikely assumption is that all 80 percent of customers on CPP-F and CPP-V rates would respond over the 16-year period at the same level as customers in the SPP experiment. As noted above, the SPP experiment offered customers a $175 incentive for their participation in 2003. These customers were opt-in (affirmative enrollment) rather than default enrollments. Even though we include significant expenses for customer education and awareness, as well as notification of CPP events, it is unlikely that the entire population that defaulted on to the rate on average would be as informed

and as responsive as SPP customers. Previously, we described concerns and uncertainties associated with whether AB1-X would preclude a default implementation of CPP.[30]

E. Net Present Value Analysis

Table 3-16 summarizes the overall pre-tax costs and benefits of Scenario 4. Also shown is the after-tax NPV for this scenario on a cash flow basis, and the present value of the revenue requirement over the 16-year analysis period.

Table 3-16
Summary of Cost/Benefit Analysis for Scenario 4 ($Millions) Using the July 21, 2004 Ruling's Assumptions for Avoided Resource Value

Costs	Benefits	Pre-tax Present Value	After-Tax NPV	Rev. Req. Present Value
($1,298.4)	$804.6	($493.8)	($402.9)	($951.8)

Scenario 4 analysis results in a negative Revenue Requirement Present Value of $951.8 million and does not support the implementation of full AMI deployment. The Revenue Requirement analysis incorporates the costs and benefits derived in the Scenario 4 analysis, plus the recovery of SCE's net investment in any removed meters, plus the rate of return and tax impacts of the AMI-related investments. If SCE's recommended assumptions for computing demand response benefits described in Appendix D were used, as shown in Table 3-16 above, the negative Revenue Requirement would be $1,105.4 million, as shown in the Table 3-17 below.

[30] *See* Volume 1, Section II.

Table 3-17
Summary of Cost/Benefit Analysis for Scenario 4 ($Millions) Using SCE's Assumptions for Avoided Resource Value

Costs	Benefits	Pre-tax Present Value	After-Tax NPV	Rev. Req. Present Value
($1,298.4)	$651	($647.4)	($494.2)	($1,105.4)

V.

BEST PARTIAL DEPLOYMENT BUSINESS CASE ANALYSIS (SCENARIO 17)

This section provides our "best case" approach to partial AMI deployment. Partial AMI deployment is best suited for the portion of our service territory where we can reasonably expect to realize the greatest demand response benefits. We believe the most populated communities of Climate Zone 4, as delineated in the Statewide Pricing Pilot (SPP) afford us the best opportunity to meet this objective. This includes Lancaster, Palmdale, Victorville, Apple Valley, and the populated areas of the Coachella Valley, including Palm Springs and the surrounding communities. The following sections describe the costs and benefits we expect will result from implementation of this scenario. These costs and benefits are described as "incremental" to our "Business As Usual" case, as presented in Appendix G. All costs and benefits have been quantified using the Ruling's assigned cost and benefit codes. We also present a discussion of the uncertainties and risk analysis for this scenario, as well as a discussion of the NPV analysis. The operational activities, processes, and procedures were discussed above. The default rate for Scenario 17 is CPP-F for residential customers, and CPP-V for C & I customers under 200 kW. Scenario 17 results are summarized in Table 3-18.

Table 3-18 Summary of Costs and Benefits for Scenario 17 (000s in 2004 Pre-tax Present Value Dollars)	
Cost	$(164,158)
Benefits	77,691
Pre-Tax PV	($86,467)
After-Tax NPV	($60,880)
NPV of Rev Req	($129,901)

A. Costs

Appendix A of the July 21, 2004 Ruling classifies AMI deployment costs into six broad cost categories: Meter System Installation and Maintenance; Communication Systems; Information Technology and Applications; Customer Services; Management and Other; and gas service costs (which are not applicable in any of SCE's scenarios). Table 3-19, below, summarizes our estimated costs for Scenario 17 in the five applicable cost categories.

Table 3-19 Summary of Costs for Scenario 17 (000s in 2004 Pre-tax Present Value Dollars)	
Cost Categories	**Total**
Metering System Infrastructure	$60,062
Communications Infrastructure	6,478
Information Technology Infrastructure	45,475
Customer Service Systems	23,122
Management and Miscellaneous Other	29,021
TOTAL:	164,158

The following subsections provide our analysis of these cost categories along with the unique cost codes within each cost category.

1. Meter System Installation and Maintenance

The cost categories of MS-1 through MS-11 correspond to the costs associated with procurement, supply chain management, testing, installation and associated support

costs. The following sections describe the costs associated with each of those areas in more specific detail.

a) Meter Reader Transition Costs (MS-1)

We are assuming that our current FSRs and Meter Readers will be utilized for the "Project Temporary Installer" positions, as discussed further in cost category MS-5. This will cause a chain reaction of existing meter reading personnel, moving up to fill the vacated FSR positions. At the start of 2006, we estimate that we will have 59 vacancies in our meter reading staff caused by employee movement to other areas to support AMI deployment. We plan to fill those vacancies early in the deployment process.

When filling these positions, we have taken into account, as an incremental AMI cost, the productivity differential between a newly hired meter reader and an experienced meter reader. As such, in addition to the 59 vacancies that will be filled, we will need to hire 21 additional meter readers to compensate for the loss in productivity due to this learning curve. The total anticipated incremental cost of labor and non-labor due to the loss in productivity is $2.76 million in 2004 present value dollars.

b) Supervision of Installer Workforce (MS-2)

With the addition of new staff (discussed in the cost category descriptions for MS-1, MS-5, and MS-12), we will need to hire additional supervisors and support personnel. We forecast a need to hire one additional supervisor and one Supervising Field Service Representative for each of the three major service centers involved in the deployment. We will also add three additional FTEs to handle revenue protection activities (discussed in the cost category description for MS-12). We also expect to hire one FTE to provide support with deployment tracking and reporting. Overall, these 10 incremental FTEs are estimated to cost $0.84 million.

c) Cost of Purchasing Meters (MS-3)

Our preliminary estimate is that we will procure approximately 500,000 meters at a cost of $33.7 million over the 2006 to 2021 timeframe. We will procure four different meter types for the AMI deployment.

We will initially procure approximately 325,000 meters in order to replace the existing meters installed in the Zone 4 area. Table 3-20 shows the types of meters, quantities, and prices that will be procured for partial deployment.

Table 3-20
Meters, Quantities and Prices in Partial Deployment

Meter Type With Communication Module	Amount	Base Cost
< 20 kW residential single phase	300,942	$50
< 20 kW network	2,946	$130
< 20 kW 3-phase commercial & residential	11,241	$320
> 20 kW commercial	8,760	$700
	324,603	

As discussed above, in addition to the cost estimates in Table 3-19, we will incur additional costs for meter lock rings and adapters.

Our analysis shows that following the installation phase, we will have meters that fail after the three-year warranty period. We estimate that there will be approximately 82,000 meter failures during the 2009 to 2021 timeframe based on the projected failure rate. In those cases, we will need to procure and install new AMI meters. Table 3-21 illustrates the expected meter type and volumes associated with replacing these failed meters.

Table 3-21 Cost Table for Meter Failures—Out of Warranty Purchases for Scenario 17 (2009 Through 2021)	
Meter Type With Communication Module	**Quantity**
< 20 kW single phase	**75,963**
< 20 kW 3 phase commercial & residential network	**744**
< 20 kW commercial	**2,837**
> 20 kW commercial	**2,392**
TOTAL	**81,936**

In addition to installing AMI meters on existing meter sites, we will need to install AMI meters as we experience customer growth. We estimate approximately 82,000 new meter sets during the 2006 to 2021 timeframe due to customer growth. Table 3-22 shows the expected meter type and volumes associated with these new meter sets.

Table 3-22 Projected Meter Growth for Partial Deployment (2006 Through 2021)	
Meter Type With Communication Module	**Quantity**
< 20 kW single phase	76,368
< 20 kW network	748
< 20 kW 3-phase commercial & residential	2,853
> 20 kW commercial	2,404
TOTAL	82,373

d) Installation and Testing Equipment Costs (MS-4)

In 2006, we estimate that we will incur costs for tools, equipment, materials, supplies, uniforms, and vehicle costs associated with the new installers, meter

readers, field service representatives, supervisors, and various support personnel. We also forecast additional costs will be incurred for facility costs. Current SCE service center facilities cannot house the required incremental personnel. Facilities will either be modified to handle the incremental personnel or portable facilities will be leased. In 2006, we will incur $1.82 million for installation equipment and facility costs.

In a partial AMI deployment, we would be able to take advantage of our existing equipment and would not incur any incremental costs associated with reconfiguring our meter testing equipment.

e) Installation Labor (MS-5)

(1) Residential and Small Commercial (<20 kW)

In order to meet the partial deployment schedule, we estimate that additional personnel will be needed to install approximately 325,000 meters. We project the need for 59 project temporary installers during 2006.[31] The cost for the additional personnel to perform installations is estimated to be $4.27 million in 2006.

(2) Complex Meters

To meet the partial deployment schedule, we estimate that additional personnel will be needed to install approximately 17,900 complex meters. While we rely on both full-time and contract resources in the full deployment scenario, we are solely utilizing full-time resources for the partial deployment scenario. In 2006, we will dedicate 27 Meter Technicians to these installations. These resources will also need to work overtime in order to keep up with the volume of installations. We have estimated that the overtime that will be worked is equivalent to one incremental full-time employee

[31] As in the full deployment scenario, we base this estimate on the assumption that an installer will install 25 residential meters per day or 18 commercial/industrial meters per day.

in 2006.[32] The total labor cost for all complex meter installations is estimated to be $2.22 million in 2006.

f) Meter Installation Tracking Systems (MS-6)

We expect that meter failures will occur throughout 2006. We plan to hire additional analysts to assist with tracking the meter failures. These analysts will look for trends in the failure data so that we can resolve communication or product issues with the vendor. We estimate the cost for this additional activity at approximately $0.15 million in 2006.

g) Panel Reconfiguration/Replacement (MS-7)

As described in the full deployment scenario, for the purposes of this business case analysis, we relied on our experience to develop a per meter damage cost estimate of $0.14. These costs are primarily attributable to damage caused to the customer's panel during new meter installation. Overall, the costs associated with these activities are estimated to be $0.06 million in 2006.

h) Potential Customer Claims (MS-8)

We expect to incur costs related to potential customer claims as a result of the AMI deployment. However, for purposes of this analysis, these costs have been reflected as part of the cost estimate for cost category MS-7 since we were not able to delineate the customer claim-related portion of the costs discussed above.

i) Salvage/Disposal of Removed Meters (MS-9)

As installers remove non-AMI meters, they will return these meters to the service centers. We plan to contract with a salvage company to handle removing these meters from each of our service centers. As such, we have not assumed any incremental

[32] As in the full deployment scenario, we based these estimates on the assumption that a Meter Technician can install an AMI meter in 2.5 hours on average.

costs to handle the non-AMI meters. Throughout the meter deployment period, we anticipate that there will be AMI meter failures in the field. Once the installer returns the failed AMI meter to the service center, the meters that are still under warranty will be returned to the vendor for replacement. We will require additional personnel to handle the processing of meters returned to the vendor. We estimate $0.55 million in labor costs for this activity.

j) Supply Chain Management (MS-10)

Our PAMM group is responsible for receiving and stocking meters at our central distribution facility. We expect to add more personnel to handle the increased volume of meters that will be received and processed in the central distribution facility. During the 2006 deployment period, we estimate the need for four material handlers responsible for receiving the meters from delivery trucks, storing the meters within the warehouse, and staging the meters for distribution. We also forecast the need for two warehouse clerks to maintain the integrity of the inventory by processing receipts, conducting inventories, and tracking assets. We will need a heavy-transportation driver to deliver the new AMI meters to our Meter Shop for testing and then out to the various SCE service centers for field installation. Further, we anticipate the need for additional personnel to supervise the new hires and project support personnel to provide forecasts to suppliers and to expedite and track purchases. Throughout the 2007 to 2021 time period, we will maintain some of these additional personnel to process the meter failures in the field. This processing includes sorting, packaging and shipping the meters back to the supplier as well as receiving and tracking the meters when they are returned. We will maintain two FTEs in 2007, tapering off to one FTE from 2009 to 2021. We estimate the cost for the additional personnel at $2.00 million over the 2006 to 2021 timeframe.

Currently our central distribution facility is at 95 percent capacity, maintaining a monthly average of 25,000 growth and new installation meters. Under

partial AMI deployment, we expect to increase our meter inventory by 20,000 meters per month. Since the facility will need to accommodate both the new AMI meters as well as meters for the non-AMI customers, a new facility is required through first quarter of 2007 to house the meter inventory.[33] Other non-labor costs that we will incur from 2006 to 2021 are for miscellaneous equipment, packing supplies and freight costs for delivering materials to the service centers on a just-in-time basis. The estimated non-labor cost is $0.95 million over the 2006 to 2021 timeframe.

As the meters are delivered to various service centers, additional personnel are required to process the meters at the service center locations. This processing includes verifying receipt of the meter, staging for deployment, tracking of returned meters and ongoing inventory management. We estimate the need for three additional employees to handle these activities at an estimated cost of $0.78 million in 2006.

k) Training (Meter Installers, Handlers, and Shippers) (MS-11)

For employee training needs, we looked at both the trainee-related cost of non-productive (seat) time spent in the classroom, as well as the cost of the trainer and training staff. Depending upon an employee's position, they will have to take training classes, ranging from new hire meter reading classes to meter installation classes. We estimate that the seat time and travel costs for our field personnel will be $1.09 million over the 2006 to 2007 timeframe. The cost associated with developing materials for these training classes is estimated to cost $48,000 in 2006.

It is expected that most of the PAMM employees assigned to the AMI project will be new hires and will require training in all aspects of logistics including, but not limited to, safety, systems, equipment, procedures and processes. Our PAMM

[33] The start-up costs for a new facility are detailed in cost category MS-11.

Organization estimates training costs of approximately $0.57 million. As mentioned in cost code MS-10, our current central distribution facility is at 95 percent capacity and a new facility will be needed to house the meter inventory. In addition to the actual facility leasing costs, we will incur equipment and supply costs to connect the new facility with our existing communications network. We estimate that we will incur $1.37 million in costs in 2006 to make this facility operational.

l) Maintaining Existing Metering Systems (MS-12)

As meter failures occur in the field, replacement meters will need to be set. FSRs will handle this work for the residential and small commercial customers. We estimate the need to hire two additional FSRs beginning in 2006 to support the meter replacement activities.

Throughout the installation period, we expect our installers will discover potential energy theft situations that need further investigation. This assumption is based upon our experience with the Van-based AMR deployment. We plan to hire additional revenue protection investigators responsible for investigating these potential theft situations. With the increased potential to identify possible theft situations, we expect to increase our current investigator staff by two FTEs in 2006.

Today, potential theft situations are usually brought to our attention by our meter reading staff. Given that a majority of the meter reading staff will no longer be needed in most of Zone 4, we will hire one additional support person to analyze meter read data in an attempt to determine potential theft situations to be further investigated.

The labor costs for incremental FSRs, revenue protection investigators and associated support personnel are estimated at $4.79 million for the 2006 to 2021 timeframe. We will also incur $0.74 million in costs for tools, equipment, materials, supplies, uniforms and vehicle costs associated with these incremental personnel.

Additional non-labor costs are forecasted for battery replacements in the AMI meters installed on the greater than 20 kW commercial accounts. In 2016, we will begin the process of replacing these batteries and the replacement process will continue through 2021. We estimate the cost of replacement batteries will be approximately $37,000.

As the AMI communication infrastructure is deployed, we anticipate new issues to develop from the implementation of new systems and the large number of meter changes. These will impact our ability to prepare and deliver accurate customer bills in a timely manner. We estimate the need for 2.6 FTEs in 2006, 2.9 for 2007 and 2008, then decreasing to 0.9 FTEs in 2009 for project support to resolve AMI issues affecting billing. The estimated cost of this activity is $0.82 million over the 2006 to 2009 timeframe.

m) Pick-up Reads (MS-13)

When a meter fails, the failure can be caused by a registration issue or a communication issue. In either case, it will be necessary to send a meter reader to collect a pick-up read from that meter in order to maintain timely and accurate customer billing. The labor costs for this cost category are estimated to be $0.28 million over the 2006 to 2021 timeframe.[34] Non-labor costs of $0.22 million will be incurred for tools, equipment, materials, supplies, uniforms and vehicle costs associated with these meter reading activities.

n) Meter Replacement Costs (MS-14)

As we described in cost category MS-12, we will need to replace the batteries in the AMI meters that are installed on the greater than 20 kW commercial

[34] As in the full deployment scenario, our personnel estimates are based upon a pick-up read rate of 56 reads per day.

accounts. While we did estimate incremental labor costs for this replacement activity in the full deployment scenario, we are assuming that we will be able to absorb the physical battery change-out with our existing Meter Technician workforce in Scenario 17.

In addition to the labor costs described in MS-12, we will also incur equipment costs of approximately $34,000 for tools, equipment, materials, supplies, uniforms and vehicle costs associated with the additional personnel handling meter replacements.

2. Communications Infrastructure

a) Review/Specify Security System (C-1)

As we design the new communications infrastructure, it will be necessary to assess the systems needed to ensure the security of the data transmitted within the network. We plan to engage contractor resources to assist us with this assessment. The costs for this assessment will be incurred in 2006 and are estimated to be $73,000.

To ensure the accurate transmission of data from the meter to the billing systems, we will dedicate personnel to review the operational design and system requirements. We estimate the need for additional personnel for these activities in 2006 at a cost of $284,000.

b) Network Placement Site Surveys (C-2)

There are no incremental costs associated with this cost category.

c) Mapping Network Equipment on Company Facilities (C-3)

We will incur incremental labor costs during the 2006 to 2007 installation timeframe necessary to map MCC take-out point installations. Engineers will need to determine appropriate placement of the eighteen MCC take-out points within SCE's service territory. Once the MCC take-out point locations have been identified by the engineers, communication technicians will be responsible for installing the equipment.

The labor costs associated with replacing failed MCC take-out points is also included in the estimate for this cost category. Overall, we estimate the labor costs for these activities at $0.12 million.

We plan to utilize contract personnel to handle the installation of the collectors, packet routers and the antennas for the MCC take-out points, the replacement of failed equipment, as well as the battery-change out process. The contractor labor and vehicle costs associated with these activities are $0.49 million.

d) Staging Facilities for WAN/LAN Equipment and Mounting Hardware (C-4)

For the communications infrastructure, we will configure and test 100 percent of the network infrastructure equipment before it is deployed to the field for installation. The labor costs associated with performing these activities on 928 collectors, 10 packet routers, and eighteen MCC take-out points is estimated at $0.12 million for the 2006 to 2008 period.

In terms of maintenance costs, we currently do not have facility space that can accommodate the eight FTEs needed to maintain the communications network (these personnel costs are further described in cost category I-15). Our cost estimate includes the lease cost for a new facility which will continue over the 2006 to 2021 time period. In 2006, we will incur facility set-up charges such as costs to connect the new facility with our existing communications network. Overall, the costs associated with this facility are estimated at $0.33 million over the 2006 to 2021 timeframe.

e) Review/Develop Strategies to Retrieve/Process Data From Meters (C-5)

In determining the appropriate strategies to retrieve and process meter data, we needed to evaluate IT application solutions. Given the data retrieval and processing requirements associated with AMI, we need to develop new applications or, in some cases, enhance existing applications to handle these requirements. Section III of

this volume details the various IT application solutions that need to be developed or enhanced in the areas of meter supply chain management, meter change workflow and meter read conversion. We have estimated approximately $0.37 million in contractor costs associated with the IT application solution design.

Our Billing Organization will continue to partner with our IT organization in determining strategies for data retrieval and processing. They will assist IT in determining the system requirements needed to prepare and deliver accurate bills in a timely manner to those customers with AMI meters. Given the additional enhanced applications, we expect project management and business analyst support labor costs associated with these activities to also increase. In addition, our Billing Organization will need to dedicate personnel to determine how its processes will be modified in order to accommodate the additional work that will be generated due to accounts failing system validations for usage-related reasons. We estimate $1.06 million in project management and business analyst support labor costs for these activities over the 2006 to 2008 timeframe.

f) Auxiliary Equipment (C-6)

Our analysis indicates that we will incur $0.42 million in auxiliary equipment costs over the 2006 to 2021 timeframe. With regard to the communications infrastructure, auxiliary equipment for the MCC take-out points and collectors is required in order to make the communications infrastructure operational. For the eighteen MCC take-out points, antennas and other equipment will need to be installed on each unit. Each of the 928 collectors will be equipped with a battery, which is estimated to have a six-year life. Beginning in 2012, we will need to begin changing the batteries in the collectors. In order to minimize installation error, contractor personnel who handle the equipment in the field will be provided with refurbished equipment instead of having them attempt to change the batteries in the field. In 2012, 100 new collectors will be

purchased to begin this battery change-out process. The collectors that are removed from the network will be retrofitted with the new battery and then redeployed to the field.

For meter installations, there will be a subset of meters that require an external antenna to be installed in order to ensure that they can communicate properly with SCE's network.[35] The majority of these antenna costs will be incurred during the initial deployment period in 2006. However, the costs will continue through 2021 to reflect antenna costs associated with the loss of communication due to RF interference and new meter sets related to customer growth. Overall, the cost is estimated to be $0.70 million over the 2006 to 2021 timeframe.

g) Pole Replacement (C-7)

We expect there will be no pole replacements required to support the partial AMI deployment in Zone 4.

h) Communications Link from Meters to Data Center, WAN/LAN Servers (C-8)

In Scenario 17, we expect to incur Digital Signal Level 3 (DS3) costs. A DS3 is a high-capacity telecommunication circuit. We plan to install one DS3 to accommodate the additional traffic that is expected on our website. The bulk of the non-labor costs are associated with the leasing costs that we will incur from the telecommunication provider. We will also incur contractor costs in 2006, 2011, 2016 and 2021 associated with the installation and replacement of equipment related to upgrades to the communications infrastructure that will be discussed below in cost code C-10. Overall, the cost is estimated to be $0.96 million over the 2006 to 2021 timeframe.

[35] We assumed one percent of all residential and less than 20 kW commercial meter installations will require an external antenna. For greater than 20 kW commercial meter installations, we have assumed that 20% of the installed meters will require an external antenna.

i) Install Cross Arms/Mounting (C-9)

There are no incremental costs associated with this cost category.

j) Purchase Network Communication Equipment and Hardware (C-10)

Through mid-2007, we plan to install 928 collectors. Once the radio frequency networks are operational, we will be able to determine the specific areas within Zone 4 that are not communicating with the network and determine whether a collector can be deployed to cover that location or whether it will be a RF "blind spot," and thus will not possess remote read capability.

The cost estimates for cost category C-10 also include the equipment costs associated with 10 packet routers. As discussed previously, we will install packet routers in order to ease congestion on the network and ensure that data is transmitted to the network in a timely manner. The equipment costs for the 18 MCC take-out points are also included in the cost estimates for this cost category. In order to make the unit operational, each MCC take-out point will need to have four radios installed.[36]

Table 3-23 describes the annual deployment volumes associated with the communication infrastructure.

[36] Other equipment is also needed to make the MCC take-out point operational. The costs associated with this equipment are discussed in cost category C-6.

Table 3-23 Communications Infrastructure Deployment Volumes			
Equipment	**2006**	**2007**	**2008**
Collectors	515	310	103
Packet Routers	7	3	0
MCCs	12	6	0

Throughout the course of the deployment, we expect to have various equipment failures. This will require us to incur additional labor and material costs to replace this failed equipment.[37] The communications infrastructure cost associated with this cost category is $1.45 million over the 2006 to 2021 timeframe.

As meters are installed, the installers and meter technicians will utilize an RF verifier tool to test whether the communication module is functioning properly. We will also be procuring Local Area Network (LAN) assessment tools to help troubleshoot problems when we determine meters are not communicating with the network. The estimated costs associated with procuring this equipment in 2006 is $56,000.

k) WAN/LAN Training (C-11)

There are no incremental costs associated with the training for the installation of WAN/LAN equipment.

l) Cost of Attaching Communication Concentrators (C-12)

In Scenario 17, cost category C-12 is used to capture the costs associated with various development tools licenses and fees. Non-labor costs of $50,000 are being charged to this cost category over the 2006 to 2007 timeframe.

[37] As in the full deployment scenario, we have assumed an annual failure rate of one-half of one percent.

m) Contracts to Retrieve Meter Data (C-13)

There are no contracts required to retrieve the meter data and services.

n) Dispatch and O&M of Field WAN/LAN and Infrastructure Equipment (C-14)

There are no dispatch and O&M costs associated with infrastructure equipment.

o) Electric Power for LAN/WAN Equipment and/or Meter Modules (C-15)

There are no incremental costs associated with this cost code.

3. Information Technology Infrastructure

As discussed in Section III of this volume, the IT infrastructure enhancements made necessary by partial AMI deployment will include meter installation systems meter read conversion systems and data management systems related to the collection, processing and billing of interval usage data.

a) Network Planning/Engineering (I-1)

As discussed earlier, we will be installing a communications infrastructure comprised of collectors, MCC take-out points, and packet routers. We will incur incremental labor costs of $0.66 million over the 2006 to 2008 period for the engineers and project support staff to design this infrastructure.

b) Computer System Set-up (I-2)

Our computing systems capacity will need to be increased in order to support AMI. As previously discussed, we will enhance existing and develop new applications. In Scenario 17, we are developing and enhancing additional applications to process the extensive volume of interval data that will be collected from meters to facilitate time-of-use and CPP billing. We are also enhancing SCE.com, our primary

customer interface system. We will need to procure additional hardware, storage, and operating software, including 30 additional servers and approximately 1,100 Gb of additional storage. Given the data processing requirements associated with interval usage data, we will also need to increase the mainframe resources by 123 MIPS and 254 Gb in additional storage.

Additionally, we are planning to automate the asset tracking and work order aspects of the meter installation and removal processes and will require upgrading existing field laptops and providing additional laptops with GPS capability for the FSR installers. Incremental SCE FTEs and contractor resources will be hired to handle the design and installation of the new hardware. The total cost for the computing system enhancements and associated labor are estimated to be $6.35 million over the duration of the program.

c) Data Center Facilities (I-3)

No new data center facilities will be required.

d) Develop/Process Rates in CIS (I-4)

We will be enhancing existing and developing new applications to facilitate the meter supply chain management, meter change workflow, and meter read conversion processes. A critical element of this effort will involve verifying that the new applications or enhancements do not adversely affect the systems that process meter changes and meter reads and calculate bills. To ensure there are no adverse impacts, we will employ comprehensive testing techniques, such as regression, integration, and unit and system testing. We will engage contractor resources to handle these activities during the 2006 to 2007 timeframe. We estimate the cost for these activities is $222,000.

e) New Information Management Software Applications (I-5)

Our Customer Service organization will partner with our IT organization in developing system and business requirements for the revisions required at

SCE.com. They will also participate in testing the new website before it is launched for customer use. After the website is launched, they will identify system improvements to ensure customer friendliness and ease of use. We have estimated $0.17 million in labor costs associated with these activities over the 2006 to 2007 timeframe.

f) Records (I-6)

New applications will be developed and existing applications will be enhanced to support automating the meter change workflow and meter read conversion processes to accommodate the meter change volumes in this business case. The new data management systems including Usage Calculation, Service Billing and SCE.com will also require support. The costs associated with developing the system requirements and database schema is captured in this cost category. We estimate the need for additional contractor resources at a cost of $1.08 million over the 2006 to 2007 timeframe.

g) Update Work Management Interface to Process Additional Meter Changes (I-7)

Another critical element of system enhancement and development is designing the interfaces between the various systems and verifying that they are working as designed to ensure that information flows appropriately. We will engage contractor resources to handle these activities during 2006. We estimate the cost for these activities is $30,000.

h) Maintain Existing Hardware/Software that Translates Meter into Bills (I-8)

Our Billing Organization will partner with our IT organization in determining system requirements that will be needed to gather usage data and translate it into billing data. Once the system requirements are identified, they will also assist in the testing of new software functionality. We have estimated $1.3 million in project

management and business analyst support labor costs associated with these activities over the 2006 to 2021 timeframe.

As detailed in the description for I-7, we will engage contractor resources to handle interface design and verification activities during 2006. In terms of the I-8 cost category, we estimate the cost for these activities is $177,000.

i) Process Bill Determinant Data (I-9)

As usage data is collected and processed, we expect that additional customer service representatives will be needed in the Billing Organization to manually process accounts that the system is unable to process due to usage validation failures. Our billing cost estimate is $3.4 million for these activities.

In Scenario 17, with the introduction of demand response rates, we will significantly increase the amount of usage data that is collected and processed. Instead of having one read and one time stamp per month for each account, we will now have 730 reads and 730 time stamps per month. In terms of our IT systems, we will also need to dedicate resources to define and develop processes which will support the rules that will determine whether data is processed by the system or whether it needs to be reviewed manually by a customer service representative. We will engage contractor resources to handle these activities during the 2006 to 2007 timeframe. We estimate the cost for these activities at $0.51 million.

j) Contract Administration and Database Management (I-10)

There are no incremental contract administration costs. The costs associated with infrastructure database management are included in cost code I-16.

k) Exception Processing (I-11)

As meter failures occur, we expect some accounts will fail billing system validations and will require manual intervention. This manual processing involves determining how a bill will be processed when a meter failure occurs during the

middle of a billing period. Depending upon the nature of the meter failure, a judgment call is often required with regard to estimating consumption. Of the total meter failures, we estimate that 50 percent will require manual processing. In Scenario 17, with the introduction of new demand response rates, we expect that there will be additional exceptions that result during the billing process due to the significant amount of data that will be processed in order to calculate a bill. We will also be handling additional activities associated with processing rate changes for customers who opt-out of their TOU default rate. As such, additional customer service representatives will be needed to manually process these accounts to ensure that customers continue to receive timely and accurate bills. Our personnel cost estimates of $1.88 million over the 2006 to 2010 timeframe are based upon processing five accounts per hour for the first three years. As employees become familiar with how to handle these accounts, we expect their productivity to increase to 10 accounts per hour, beginning in 2009.

In terms of our IT systems, we will need to dedicate personnel to defining and developing the process by which exceptions are handled. We will engage contractor resources to handle these activities during 2006. We estimate the cost for these activities is $98,000.

l) License/O&M Software Fees (I-12)

We have not identified any additional license fees that may be required under the partial deployment scenario.

m) Ongoing Data Storage/Handling (I-13)

There are no incremental ongoing data storage/handling costs due to similar data capacity requirements in the "Business As Usual" case.

n) Ongoing IT Systems (I-14)

As discussed in Section III of this volume, we will be developing new applications and enhancing existing applications to facilitate the meter supply chain

management, meter change workflow, and meter read conversion processes. Scenario 17 will require significant application enhancements, particularly those associated with the Usage Calculation System, in order to process the extensive volume of interval data. We will need to dedicate additional contract and SCE resources to support these activities. The ongoing O&M for these applications includes applications support, security administration, database administration support, maintenance, and enhancement activities and is provided from a mix of contract and SCE labor. The total estimated cost of this activity is $6.95 million during the 2006 to 2021 timeframe.

o) Operating Costs (I-15)

Once the communications infrastructure is fully operational, it will contain nearly 16,000 commercial meters with radios, 928 collectors, 10 packet routers, and 18 MCC take-out points. As the infrastructure is developed, we will need to phase in 8 incremental FTEs and additional contractors to handle the on-going management of this network. Based on our current experience with managing the network, our personnel estimate assumes that we will need 20 engineers and IT specialists for every 40,000 radios. The incremental labor and contractor costs from 2006 to 2021 are $9.6 million.

p) Server Replacements (I-16)

We expect to replace the computing systems hardware identified in cost category I-2 on the basis of a five-year technology refresh cycle. As such, the hardware refresh would occur in 2011 and 2016. We did not include a final refresh in 2021 based on our assumption that the entire AMI system will be obsolete and need to be renewed with new technology and supporting infrastructure. Contractor resources and incremental SCE FTEs will need to be utilized to handle the design and installation of the new hardware. Incremental SCE labor costs for database management are also included in this cost category. The costs for refreshing the computing systems and associated labor are estimated to be $13.01 million.

4. Customer Service Systems

This section will describe the Customer Services cost codes utilized in assigning costs for this Partial Deployment scenario. For our purposes, Customer Services include Call Center costs, Meter Order Processing, Customer Communications, and a portion of billing-related costs.[38] We expect to spend approximately $23.1 million in this cost categories over the entire analysis period. This cost category does not include meter reading and field services costs because these functions are essential to the Meter System Installation and Maintenance costs discussed in Section III of this volume.

Appendix A of the July 21, 2004 Ruling did not identify any "start-up and design" related costs in the Customer Service Systems cost category. We have, however identified some billing related "start-up" costs associated with the specification of security systems, the development of data retrieval strategies, network planning, and the meter RFP proposal specifications. These costs are included under cost codes C-1, C-5, I-1, and M-2.

a) Installation (CU-1 through CU-4)

This section will describe the one-time costs that are expected to be incurred during the installation process for AMI. Generally these costs are attributable to the implementation process itself, rather than on going operations. For the most part, these costs will no longer be incurred once the project installation phase is complete.

(1) Customer Records, Billing and Collections Work Associated with Roll-out of the Meter Change Process (CU-1)

The 2004 present dollar value of all costs in this cost code is expected to be $2.99 million over the duration of the analysis period. The majority of costs

[38] The majority of billing system installation and operating costs are included in the Information Technology section because cost codes I-9 and I-11 better described the billing related functions of "validating and creating billing determinate data" and "Exception Processing."

in this cost code relate to the processing of meter orders. Meter order processing costs are based entirely on the volume of anticipated meter change orders in excess of those that would normally be processed under normal business conditions. These costs are driven by routine change orders that fail to process initially in the automated meter processing system and must be manually reviewed as an exception and reprocessed. This is a labor-intensive process that is estimated to require approximately sixteen FTEs in the initial year of implementation (2006), and will drop off to three FTEs in 2007, two in 2008, one in 2009 and 2010. There will be no incremental meter order processing cost once the installations are complete. Total meter order processing costs over the duration of the analysis period are expected to be $1.52 million.

Billing has identified the need for additional personnel to process an expected increase in billing exceptions and to support their revenue protection activities. As discussed in cost category MS-12, we expect our installers to discover potential energy theft situations that need to be investigated during the deployment process. Our Billing Organization will contribute to the resolution of these potential energy theft situations by performing analysis, interfacing with the field personnel, potentially rebilling customers' accounts, and corresponding with customers. We have estimated a cost of $1.47 million for these activities over the 2006 to 2021 timeframe.

(2) Increased Call Center Activity During Installation Phase of the Partial Deployment (CU-2)

We expect a relatively small volume of calls will result from media messages introducing the change to the affected customers. We expect one-half of one percent of customers designated for AMI installation will call as a result of mass communications. This estimate is based on prior experience with similar mass communication campaigns. We expect a slightly larger volume of calls to occur as a result of the initial "meter change letter" that will be sent to all affected customers. We

estimated that three percent of these customers would call if only a letter or bill insert is sent and four percent if door hangers are left after service is complete. The calls will result from the change letter, from the service personnel being observed on the property, and from door hangers. The three percent and four percent estimates are based on management's experience with other communications in which a service visit is required. In Scenario 17, we also expect increased call volume resulting from rate change letters and "opt-out" inquiries to our Call Center. First, we will notify qualifying customers that their rate will be changed to a CPP rate schedule. We estimate that five percent of customers will call when notified that their rate is being changed. The five percent estimate is based on our experience with other communications in which rate modifications are involved. Second, there will be customer calls related to opting out of the new rate. Our estimates assume 27 percent of customers call about opting out and 70 percent of those that call will actually choose to opt-out. Overall, we are expecting an increase of approximately 300,000 calls under Scenario 17 and the total cost of increased call volume resulting from partial AMI deployment is expected to be $1.1 million.

(3) Modification and Customer Support Costs for AMI Integration to the Outage Management Systems (CU-3)

SCE's Outage Management System (OMS) is expected to function as it does today, entirely independent of the new AMI infrastructure. Other than some IT contract costs ($0.17 million), we have not identified any other incremental implementation costs related to OMS.

(4) Process Meter Changes for new Meter Installation and DA Accounts (CU-4)

The Meter Services Organization (MSO) expects to incur costs of approximately $2.48 million, primarily during the installation phase in 2006, for engineering and sample testing of meters prior to installation. MSO's field metering

installation work is classified as Meter System Installation costs in cost code MS-5. The Billing Organization expects to spend $0.15 million in this cost code, all in 2006. This covers exception processing work directly related to meter changes during the installation phase.

b) Operation and Maintenance (CU-5 through CU-10)

(1) Additional Rate Analysis Due to Multiple TOU Options (CU-5)

We expect an increase in on-going rate analysis work in our Billing Organization due to an increase in the number of customer inquiries spurred by the rate changes and the large number of meter changes taking place. Billing Organization costs in the CU-5 cost code are expected to increase by $0.13 million under Scenario 17. As new rates are introduced, we expect to experience an increase in the number of customer requests for rate analysis. These requests are handled by our Major Customer Division (MCD). MCD provides coordination between account representatives and major customers for rate analysis opt-out and contract revisions. Customers who are deciding whether to opt-out may want to request a rate analysis to determine if the rate assigned to them is the best rate to stay on or to determine if there is a more appropriate rate. The total cost for MCD associated with these activities is expected to be $0.23 million in cost code CU-5.

(2) Meter Reader and Customer Safety Related Costs (CU-6 and CU-7)

Cost codes (CU-6 and CU-7) relate to reduced customer safety and alternative safety measures, "because meter readers are no longer available." Although we recognize there is some foregone operational benefit to no longer having meter readers periodically inspecting our metering installations, we have no records relating to the frequency or value of our meter readers finding unsafe, or faulty electrical

service equipment. Accordingly, we have not included any cost estimate in these two cost codes.

(3) Customer Education of Rate Changes (CU-8)

In Scenario 17, beginning in 2007, the Call Center expects to receive customer calls related to their first series of bills after changing rates. We projected that our customers would go through a learning curve period in which a declining percentage of customers would call after each bill is received after switching to the new rate. For Scenario 17, these rate-related calls are expected to increase call volume by approximately 40,000 calls in 2007 at an added cost in cost code CU-8 of $0.17 million. Web-based rate communication costs are estimated at $0.35 million in this cost code. MCD will also incur costs of $52,000 in cost code CU-8 related to developing materials for our customer account representatives and major customers.

(4) Customer Support for Internet Based Usage Data Communication (CU-9)

We expect to receive approximately 3,000 additional calls in 2007 from customers with questions related to their first review of usage data presented on SCE.com. As previously discussed, we projected that our customers would go through a learning period in which a declining percentage of customers would call after each session on SCE.com to review usage data. The total cost over the analysis period associated with these additional calls, which are charged to cost category CU-9, is estimated to be $12,000.

In Scenario 17, our Customer Service organization will incur costs related to the development of market research surveys to learn about customers' wants and needs so that the information learned can be applied to enhance the website. Costs will also be incurred related to assisting major customers in learning how to use the website and how to access their usage data. We will also provide support to the Customer Communications organization by handling customer telephone calls regarding complex

website related questions. The costs for these web-based activities, which will be charged to cost code CU-9, are estimated to be $4.9 million. These web-based costs include the total cost of replacing the existing systems and we have identified over $4.1 million in offsetting benefits, which are included in benefit codes CB-8 and MB-1.

The increased use of internet usage data is also expected to result in additional Billing Organization costs of approximately $0.85 million.

(5) Outbound Communications (Mass Media Costs for Print, Radio and TV) (CU-10)

The most significant Customer Services cost increase attributable to AMI deployment is related to the mass media marketing costs, a portion of which are charged to cost code CU-10. The Customer Communications programs related to this scenario are expected to total approximately $9.5 million in this cost code. Another $6.8 million in Customer Communications and Marketing costs related to this Scenario are, by definition, included in cost code M-14 ("Customer Acquisition and marketing costs for new tariffs"). These will be described below in the "Management and Miscellaneous Other" cost category.

5. Management and Miscellaneous Other Costs

This cost category includes general overhead costs that span across two or more functional cost categories, such as project management and the administration of job skills training.

a) Buyout of Existing Itron Contract for Automatic Meter Reading (M-1)

There would be no change in the Itron AMR contract because the majority of AMR meters are located outside of Zone 4, and SCE is committed through 2011 to the current contract, including the AMR meters in Zone 4, which would no longer be read after 2006.

b) Meter RFP Process and Contract Finalization and Administration (M-2)

The development and review phases of the RFP process are expected to involve all major departments participating in the project. As a major participant in this process, the Billing Organization has included $62,000 in this cost code. All other participating organizations have included the costs associated with this process in the direct overhead costs associated with their respective start-up and installation cost estimates. The Procurement and Material Management Organization costs related to the preparation and review of the RFP were included in cost code MS-10, which was discussed previously in this section.

c) Customers' Access to usage Information (M-3)

We expect to incur approximately $0.63 million in exception billing costs attributable to the increased availability of usage information to the customer. Availability of such information combined with the more complex rate schedules is expected to heighten customer interest at a more detailed level than currently exists. The end result is expected to be an increase in the number of customer inquiries, both valid and invalid.

d) Employee Communication and Change Management (M-4)

The Billing Organization has included a total of $0.30 million in this cost code. This represents expected costs related to preparing and communicating AMI system information to employees and keeping them informed and up-to-date on the implementation of AMI and its related systems. We estimated $56,000 in additional cost for web related activities associated with employee communications over the duration of the analysis period.

e) Employee Training (M-5)

The M-5 cost code includes "systems and rate structures training." Training of call center personnel, meter readers, and meter test technicians is included in cost code M-10. There are two elements to employee training costs; the trainee-related cost of non-productive (seat) time spent in the classroom, and the cost of the trainer and training staff, including training materials, classroom preparation, etc. All trainee-related costs are included in the operational costs of each individual operating organization. Most of the training will be provided by our Job Skills Training (JST) Organization. The Billing Organization and the Call Center supplement the JST training with their in-department training as needed.

For the partial deployment case, the estimated cost of all JST training in cost code M-5 is $0.35 million for the duration of the analysis period through 2021. Billing Organization training costs in this cost code are expected to be $0.27 million for the same period. Employee communication programs on the web will add $0.25 million to this cost code. This will supplement the Billing Organization and JST training under this cost code, and it relates primarily to assuring that customer contact personnel have a clear understanding of the rates and rate options being introduced under this scenario.

f) Meter Reader Reroute Administration (M-6)

The cost of recycling and rerouting the non-communicating AMI meters has been accounted for in cost code MS-2, which was discussed previously in this section. These costs are being absorbed as a portion of the cost of the additional supervising FSR assigned to each of the three districts to supervise the AMI meter system installation process.

g) Overall Project Management Costs (M-7)

Partial AMI deployment will require the formation of a Program Management Organization similar to that anticipated for full deployment, but for a much

shorter duration, since the meter installation phase of this scenario is only one year as opposed to five years for the full deployment case. For the partial deployment scenario, a program management team consisting of eight SCE middle management and two SCE staff support personnel will oversee the one year installation phase of the project. After installation, one SCE Program Manager and two staff personnel will remain to oversee the program through 2010. We also anticipate the need for as many as 10 contract personnel supporting the program management effort during the initial installation phase in 2006. Total Program Management costs for the duration of the partial deployment analysis period are expected to be $4.5 million.

Additionally, each of the major operating departments has estimated some project management costs to support the core project management team. Total project management costs for the operating organizations are expected to be $7.6 million. We have also determined that in order to meet the deployment schedule proposed in the July 21, 2004 Ruling, with deployment starting in 2006, there will likely be project planning tasks that should occur in 2005. However, since the July 21, 2004 Ruling directed the business cases to start in 2006, the 2005 costs are not included in this analysis.

h) Recruiting of Incremental Workers (M-8)

Implementation of the partial deployment AMI program would affect the recruiting and hiring process within the three most heavily affected organizations: Meter Reading, Call Center, and Billing. For the most part, the incremental cost of recruiting the anticipated increase in personnel has been included in the cost estimates for each organization separately in their respective cost codes. Because of the initial start-up impacts on FSMRO personnel, that organization has included $56,000 in this cost code.

i) Supervision of Contracts and Technology Personnel Assigned to Hardware and Systems Development (M-9)

These costs are reflected within the individual operational areas and no additional costs are included under this cost code.

j) Training for Other Traditional Classifications (M-10)

The overall training impact of this scenario was discussed previously in this Section under cost code M-5 relating to Systems and rate structure training costs. We estimate approximately $0.57 million will be spent training Call Center, Field Services and Meter Reading personnel under cost code M-10.

k) Work Management Tools (M-11)

Our Business As Usual operations include the cost of providing our management with the most up-to-date work management tools available. No incremental cost has been included for new or additional work management tools under any of the AMI scenarios.

l) Capital Financing Costs (M-12)

Capital and financing costs are included in the NPV calculations at SCE's long-term weighted average cost of capital.

m) Cost of Increased Load During Mid-peak and Off-peak Hours (M-13)

There is no change in the cost associated with mid and off-peak loads (M-13) under this scenario.

n) Customer Acquisition and Marketing Costs for New Tariffs (M-14)

Incremental marketing and customer education costs in this cost code combined with those described in cost code CU-10 above make up the total customer communications program described previously. This cost code includes $6.8 million of the $16.3 million to be spent on marketing and customer education programs that will be

necessary to secure 80 percent of the AMI metered customers on CPP rates, and retain them on those rates for the duration of the analysis period. The remaining $9.5 million in marketing costs was discussed under cost code CU-10.

o) Risk Contingencies (M-15)

Overall program contingency costs have been estimated at $7.5 million. Risk contingencies related to this scenario are discussed in Section D. below.

B. Benefits

Table 3-24 summarizes the Scenario 17 benefits by category and compares them to Scenario 4 benefits. Scenario 17 is similar to Scenario 4 except it applies only customers in the densely populated communities of Zone 4. Table 3-24 compares benefits using the Ruling's assumptions and SCE assumptions for the value of avoided capacity.

Table 3-24 Summary of Benefits for Scenario 17 vs. Scenario 4 (000s in Pre-tax Present Value Dollars)				
Benefit Categories	**Scenario 4**		**Scenario 17**	
	Ruling's Assumptions	**SCE Assumptions**	**Ruling's Assumptions**	**SCE Assumptions**
Systems Operations Benefits	$307,333	$307,333	$20,655	$20,655
Customer Service Benefits	8,268	8,268	3,860	3,860
Management and Other Benefits	122,316	122,316	10,309	10,309
Demand Response DR-1 Benefits	325,722	172,100	38,111	20,294
Demand Response DR-2 Benefits	41,008	41,008	4,756	4,756
Total Demand Response Benefits	366,730	213,108	42,867	25,050
TOTAL:	$804,648	$651,025	$77,691	$59,874

The following sections will describe only those benefit codes that were actually used in this preliminary analysis. Appendix H contains a discussion of all benefit codes identified in the Ruling, whether we actually included them in this analysis or not.

1. System Operations Benefits (SB-1 through SB-13)

In this section we address the potential "system operations" benefits expected to result from partial deployment of AMI to approximately 325,000 SCE customers in Zone 4. Appendix A of the July 21, 2004 Ruling identified 13 such potential benefits. In our initial review of these potential system operations benefits, we have been able to quantify $29.3 million in potential savings over the duration of the analysis period. These savings are expected to come from only three of the 13 System Operations Benefit codes. We

expect some net benefit from one other (SB-7), which we are not able to quantify at this time. Eight of the potential areas of benefit identified in the Ruling are either already being experienced by SCE, or have associated costs that more than offset the anticipated savings.

a) Reduction in Meter Readers, Management and Support (SB-1)

This is the largest area of benefits expected to accrue from partial implementation of AMI. We expect 25 meter reading positions to be eliminated, resulting in total cost savings of approximately $18 million over the analysis period. As was the case in the full deployment scenario, we expect AMI to give us the ability to remotely read approximately 94 percent of all meters in Zone 4 (94% of 325,000 = 305,000). The remaining 20,000 meters, that cannot be read automatically, will continue to be read manually on a monthly basis.[39] We do not expect to eliminate any of the existing meter reader supervisor positions since each of the three major districts have only one supervisor who supervises both FSRs and meter readers. There will continue to be a need for these positions after AMI is deployed.

b) Field Service Savings (SB-2)

We currently complete approximately one-half of all "turn-off" and "turn-on" meter orders without having to actually turn the meter on or off. This situation occurs when a "turn-on" order can be matched to a "turn-off" order for the same location, on or about the same day. Such orders can be completed merely by taking a meter read, which currently requires a visit to the site at an average cost of approximately $17 per order for "next-day" service. Virtually all of these special meter reads for matched on/off meter orders could be eliminated and replaced with the daily AMI meter read. This

[39] The remaining 30% of the meters with which we are unable to communicate are scattered throughout the Zone 4 area and are generally not adjacent to one another, thus making routine meter reading less efficient than it is today.

benefit would result in the elimination of three FTEs and a savings of approximately $2.5 million over the duration of the analysis period.

c) Phone Center Savings from Billing Inquiry Reductions Due to More Accurate Billing (SB-4)

Billing inquiries today are received for several reasons, only one of which is an inaccurate meter read. Based on a study using 2003 data, 22,791 calls were a result of meter reading errors. We used this number as a percentage of all calls to determine the percent of calls in subsequent years that would be projected as meter read error calls for each operational scenario. For the business case, we assumed that 100 percent of these calls would be avoided with automated meter reads.

For the partial deployment scenario, Table 3-25 shows the number of avoided calls that may result from the complete elimination of meter reading errors. Using the average number of Billing Inquiry calls answered per FTE in the Billing Inquiry specialty support group in 2003 (3,376), we are estimating a levelized reduction of 0.46 FTEs by 2007. This results in a total cost savings of $253,000 over the duration of the analysis period.

Table 3-25
Reduced Phone Calls – Partial Deployment

	2006	2007	2008	2009	2010	2011
Scenario 14	0	1,553	1,553	1,553	1,553	1,553

2. Customer Service Benefits (CB-1 through CB-13)

The July 21, 2004 Ruling identified 13 potential customer service benefits. Our review of these potential areas of benefit resulted in anticipated annual savings of approximately $3.9 million from just two areas over the sixteen-year analysis period of the partial deployment scenario. Savings attributable to improved billing accuracy (CB-1) due

to the elimination of estimated bills and timelier billing due to elimination of meter accessibility problems results in savings of $0.98 million. In addition, we have recognized $2.9 million in operational cost offsets to accommodate those customers who are already on demand response rates or who otherwise use the web based programs for energy management information (CB-8).

For a discussion of all other Customer Service benefit codes as they relate to partial deployment of AMI, see Appendix H.

3. Management and Other Benefits (MB-1 through MB-10)

We expect to reduce costs by approximately $0.65 million through 2021 by decommissioning 25 hand-held meter reading devices. Typically, these devices would be replaced every five years. This is a cost that would no longer be incurred and is classified as a benefit in the MB-1 category. The MB-1 benefits also include $1.2 million in website equipment offsets reflecting the avoided cost of future investments resulting from overall website infrastructure improvements needed to meet AMI program needs.

The only other Management and Other benefit code used in this analysis is MB-4 (Reduced Meter Inventory Costs). Though we do not expect an overall decrease in inventory costs, we have used this benefit code to include the avoided cost of purchasing approximately 5,100 conventional new and replacement meters each year for the full duration of the analysis period. As discussed in the Business As Usual case (see Appendix G) the material cost of 5,100 new and replacement non-AMI meters each year is significantly different than the replacement cost of these same 5,100 meters each year using AMI meters. For this reason, the total cost of all new and replacement AMI meters has been included in all AMI scenarios in cost code MS-3. The avoided cost of not purchasing conventional meters for customer growth and routine replacements is included in benefit code MB-4. For the partial deployment scenarios, this avoided cost is $8.5 million over the duration of the analysis period.

The remaining areas of potential Management and Other benefits, as identified in the July 21, 2004 Ruling, are discussed in Appendix H.

4. Demand Response Benefits

This scenario assumes that 80 percent of eligible customers are defaulted to CPP-F rates (residential) or CPP-V rates (C&I below 200kW) and those customers stay on those rates for the full duration of the business case. For the purposes of the analysis, we assumed that the customers opting-out of the CPP default rate would choose equally between a TOU rate and their otherwise applicable tariff. Our approach to estimating the demand response benefits is the same as for Scenario 4, except that we used our cooling degree hours and air conditioning market penetration for Zone 4.

We have not adjusted the above demand response benefits for Value of Service loss to customers due to participation in CPP or TOU rates. Our methodology and analysis of Value of Service Loss by scenario is presented in Appendix J. For this scenario, the Value of Service Loss is approximately $36.7 million ($2004 present value), reducing the total demand response benefit from $42.9 to $6.2 million.

C. Uncertainty and Risk Analysis

1. Operational Cost Uncertainty and Risk Analysis

We performed an operational cost and benefit risk assessment of this partial deployment scenario based on the specific cost and benefit data discussed in the sections above. For analytical purposes, this operational risk assessment focuses on the 54 cost codes that comprised nearly 80 percent of the overall cost. Once the appropriate cost codes were identified, we developed the most likely high and most likely low ranges for each of the cost codes. We then applied a Monte Carlo statistical approach to create a probabilistic range around our estimate.

a) Significant Cost Areas

For this partial deployment scenario, the total present value cost estimate (prior to adding contingencies) for full AMI deployment is $157.5 million. In the discussion that follows, we will focus on five of the significant cost areas which represent over forty percent of the total cost for this scenario.

(1) Cost Code MS-3 – Meter Purchasing

Cost code (MS-3), involving the cost of purchasing meters and meter-related communications equipment in this partial deployment scenario, is estimated at over $33 million. We estimated a range for this cost code to be: plus 20 percent and minus 15 percent. The high end of this range is based on our historical experience with price differences that occur between an RFI and the ultimate final contract. We find that vendor price increases of as much 20 percent are due to better understanding of scope, warranty requirements, and contract terms and conditions. We based our estimate on vendor quotes we received in the RFI. The range also reflects the uncertainty of meter failure. The low range is based on the fact that current meter technology is aging, and potential vendors have informally indicated that lower prices are possible for high-volume orders.

(2) Information Technology Operating Costs

Information Technology ongoing operating costs, estimated at $9.4 million, varied by plus or minus 20 percent.

(3) Server Replacements

Information Technology computing system replacement costs, with non-labor estimated at $7.4 million, varied by plus or minus 40 percent.

(4) Data Center Computer System Implementation

Non-Labor associated with data center computer system implementation, estimated at $5.4 million, was also estimated at plus or minus 40 percent.

(5) Out-bound Communications

Marketing Costs for outbound communications and mass media are estimated at $8.9 million and varied by plus 12 percent and minus 4 percent.

b) Monte Carlo Sensitivity Analysis Results

Using the cost ranges outlined above, the application of the Monte Carlo statistical analysis of costs resulted in a range of $150.8 million to $168.4 million around the estimated cost of $157.5 million for this scenario. The statistical analysis indicates that our cost estimate has about a 31 percent confidence level. This means that the project has a 69 percent chance of overrunning.

c) Contingency

We determined that contingency should be applied to the start-up and installation activities. We also believe that a 90 percent confidence level is reasonable for this type of project. Based on the analysis results, we applied a contingency of $7.5 million across the start-up and installation phases in order to achieve this confidence level.

2. Operational Benefit Uncertainty and Risk Analysis

The primary operational benefits relate to the reduction in meter readers and result in aggregate operational savings of $17.9 million. We do not expect any variation because the forecast reduction is solely a function of the AMI system communication coverage that is designed to reach 90 percent of the meters. The other identified operational savings were less than the threshold we used for analytical purposes. As a result, we did not include any operational savings in the statistical analysis.

3. Demand Response Risk Analysis

We believe that Scenario 17 demand response results are implausible for a number of reasons. First, we believe that it is unlikely that CPP rates would be imposed on a quasi-voluntary (opt-out) basis on the mass-market without first testing customer acceptance of TOU rates on an opt-out enrollment basis.

Next, we believe that if default enrollment of CPP was implemented, it is highly unlikely that 80 percent of customers would adopt the CPP rate over the entire 16-year study period. The SPP found that four to six percent of customers chose to drop the CPP-F rate after the first year of the experiment despite an offering of incentive payments to continue participation in the program in 2004, and these were customers who volunteered (or opted-in) in the first place. Moreover, a shadow-bill analysis of SPP CPP-F customers found that 26.3 percent actually had higher bills than they would have if they had stayed on their otherwise applicable rate. Over time, customers who experience higher bills will likely opt out to a more favorable rate.

Another key, but unlikely assumption is that all 80 percent of customers on CPP-F and CPP-V would respond over the 16-year period at the same level as customers in the SPP experiment. As noted above, the SPP experiment offered customers a $175 incentive for their participation in 2003. These customers were opt-in (affirmative enrollment) rather than default enrollments. Even though we include significant expenses for customer education and awareness, as well as notification of CPP events, it is unlikely that the entire population that defaulted on to the rate on average would be as informed and as responsive as SPP customers. Earlier, we described concerns and uncertainties associated with whether AB1-X would preclude a default implementation of CPP.[40]

[40] *See* Volume 1, Section II.

D. Net Present Value Analysis

Table 3-26 summarizes the overall pre-tax costs and benefits of Scenario 17. Also shown is the after-tax NPV for this scenario on a cash flow basis, and the present value of the revenue requirement over the 16-year analysis period.

Table 3-26
Summary of Cost/Benefit Analysis for Scenario 17[41]
($ Millions)

Costs	Benefits	Pre-tax Sub-Total	After Tax NPV	Rev. Req. NPV
($164.2)	$77.7	($86.5)	($60.9)	($129.9)

Scenario 17 results in a negative Revenue Requirement Present Value of $129.9 million and does not support the implementation of partial AMI deployment. The Revenue Requirement analysis incorporates the costs and benefits derived in the scenario 17 analysis, plus the recovery of SCE's net investment in any removed meters, plus the rate of return and tax impacts of the AMI-related investments.

If SCE's recommended assumptions for computing demand response benefits described in Appendix D were used as shown in Table 3-26 above, the negative Revenue Requirements would be $184.1 million, as shown in Table 3-27 below.

Table 3-27
Summary of Cost/Benefit Analysis for Scenario 17 ($Millions) Using SCE's Assumptions for Avoided Resource Value

Costs	Benefits	Pre-tax Sub-Total	After-Tax NPV	Rev. Req. Present Value
($164.2)	$59.9	($104.3)	($71.5)	($147.7)

[41] This table was prepared using the July 21, 2004 Ruling's assumptions for avoided resource value.

VI.

REVENUE REQUIREMENT AND CUSTOMER IMPACT ANALYSIS

The purpose of this section is to present our revised preliminary estimated net AMI-related revenue requirement and customer impacts for the years 2006 through 2021 for the full deployment Scenario 4 and partial deployment Scenario 17.[42] The Scenario 4 and Scenario 17 revenue requirements were developed based on the operating expenses and investment-related costs presented in Sections IV and V, respectively.

Table 3-28 provides the estimated net AMI-related revenue requirement and average customer monthly dollar impacts for Scenarios 4 and 17.

The estimated net AMI-related revenue requirement impacts by year for each scenario are calculated by subtracting the expected AMI benefits-related revenue requirement reductions from the estimated AMI cost-related revenue requirement. For illustrative purposes, SCE has also calculated a customer monthly dollar impact by year for each scenario. In order to calculate the average customer impacts, SCE utilized the total system retail customer forecast as presented in SCE's 2004 LTPP testimony filed on July 9, 2004 in R.04-04-003.

A. AMI-Related Revenue Requirement Increases

The AMI-related Revenue Requirement increase is comprised of two components: 1) New Meter Revenue Requirement, and 2) Stranded Cost Revenue Requirement. The New Meter Revenue Requirement represents the recovery of anticipated O&M expenses and capital costs associated with expected rate base amounts including depreciation,

[42] Due to the July 21, 2004 Ruling's prescribed 2006-2021 analysis period, the revenue requirement analysis does not include recovery of the remaining AMI-related plant investment as of the end of 2021, primarily for meters which would be installed or replaced between 2007 and 2021. These unrecovered costs [of approximately $58 million in unrecovered net plant for the full-deployment scenario (Scenario 4), and $3.4 million for the Zone 4 partial-deployment scenarios (Scenario 17)] would be a continuing ratepayer obligation post-2021, although they also would be expected to provide a useful life past 2021, due to the underlying assets' 15-year life and their later in-service dates.

applicable taxes and return on rate base calculated at the Commission-authorized rate of return.[43] The return on rate base amounts included in the Revenue Requirements presented in Table 3-28 uses our currently authorized rate of return on rate base of 9.07 percent.

As discussed in this volume, new meters will be placed in service over a five-year period (2006 through 2010). As the new meters are deployed, the existing or replaced meters will become stranded costs and the undepreciated balance, including anticipated negative net salvage, associated with these meters must be recovered in rate levels. As such, SCE proposes to amortize the stranded meters undepreciated net investment over the five-year new meter deployment period which will commence on January 1, 2006 and has reflected this proposal in this revenue requirement analysis.

The net investment of the stranded meters will include plant and accumulated depreciation. The stranded cost revenue requirement also includes amortization, applicable taxes and an authorized return on rate base. Applicable tax regulations allow us to deduct any remaining tax basis associated with the stranded meters as an abandonment tax loss.[44] In addition, we will also take an immediate tax deduction for costs incurred in the removal of the existing meters.[45]

B. Expected Revenue Requirement Reductions

In order to estimate the net AMI-related revenue requirement impacts, the expected cost savings derived from the AMI benefits have been deducted from the AMI cost-related revenue requirement increase. The cost savings or revenue requirement reductions

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[43] SCE has assumed a 15-year recovery period associated with the new meters.

[44] *See* Treas. Reg. 1.167(a)-8(a)(4).

[45] Removal-related costs are not required to be capitalized for tax purposes because removal of an asset is part of the life cycle of the asset being removed.

include: (1) Customer Service-related O&M reductions; (2) existing meter revenue requirement reductions; and (3) procurement cost reductions due to demand response.

Table 3-28
AMI Revenue Requirement
(000s of Dollars)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Scenario 4 - Full Deployment-DR-CPP-Opt-20 Contingency																
AMI Meter Installation Revenue Requirements	136,791	165,143	214,272	236,392	256,514	220,111	210,052	204,676	197,201	194,405	160,672	160,304	155,206	149,824	144,891	125,613
Stranded Cost Revenue Requirement - 5 year	116,136	111,876	103,474	72,094	126,892	-	-	-	-	-	-	-	-	-	-	-
Less:																
Expected O&M Reductions	(42)	(6,746)	(22,138)	(35,052)	(52,883)	(60,329)	(62,589)	(64,701)	(67,161)	(69,451)	(72,071)	(74,534)	(77,362)	(79,522)	(81,696)	(84,033)
Meter Revenue Requirement in Rates	(2,906)	(1,952)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)	(4,790)
Expected Procurement Reductions	(53)	(10,502)	(20,948)	(31,500)	(39,169)	(41,791)	(42,346)	(42,914)	(43,487)	(44,073)	(44,660)	(45,262)	(45,867)	(46,487)	(47,110)	(47,749)
Total Net AMI-related Rev Req Impact	**249,926**	**257,818**	**269,870**	**237,145**	**286,564**	**113,201**	**100,327**	**92,270**	**81,763**	**76,090**	**39,150**	**35,718**	**27,187**	**19,025**	**11,295**	**(10,959)**
Avg Monthly Customer Dollar Impact	**4.33**	**4.41**	**4.55**	**3.94**	**4.70**	**1.83**	**1.61**	**1.46**	**1.28**	**1.17**	**0.60**	**0.54**	**0.40**	**0.28**	**0.16**	**(0.16)**
Scenario 17 - Partial Deployment-DR-Zone4-CPP-Opt-20 Contingency																
AMI Meter Installation Revenue Requirements	49,278	32,418	25,770	23,710	23,698	22,533	17,657	16,809	16,432	16,049	17,315	16,756	16,379	16,041	15,699	10,968
Stranded Cost Revenue Requirement - 5 year	10,454	10,068	9,314	6,488	11,423	-	-	-	-	-	-	-	-	-	-	-
Less:																
Expected O&M Reductions	(42)	(2,243)	(3,790)	(3,913)	(4,171)	(4,217)	(4,371)	(4,519)	(4,688)	(4,847)	(5,026)	(5,197)	(5,391)	(5,543)	(5,694)	(5,858)
Meter Revenue Requirement in Rates	(275)	(349)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)	(460)
Expected Procurement Reductions	0	(3,799)	(3,864)	(3,929)	(3,994)	(4,059)	(4,124)	(4,189)	(4,254)	(4,319)	(4,384)	(4,449)	(4,514)	(4,579)	(4,644)	(4,704)
Total Net AMI-related Rev Req Impact	**59,415**	**36,094**	**26,969**	**21,896**	**26,497**	**13,798**	**8,702**	**7,642**	**7,031**	**6,424**	**7,446**	**6,651**	**6,015**	**5,459**	**4,901**	**(53)**
Avg Monthly Customer Dollar Impact	**1.03**	**0.62**	**0.45**	**0.36**	**0.43**	**0.22**	**0.14**	**0.12**	**0.11**	**0.10**	**0.11**	**0.10**	**0.09**	**0.08**	**0.07**	**(0.00)**