Application No.:
Exhibit No.: SCE-05, Vol. 01
Witnesses: C. Carazo
J. Castleberry
G. Haddox
T. Inlander
J. Kelly
K. Sweetser

SOUTHERN CALIFORNIA EDISON®

An *EDISON INTERNATIONAL*® Company

(U 338-E)

2015 General Rate Case

Information Technology (IT)
Volume 1 – Overview, O&M and Capital

Before the

Public Utilities Commission of the State of California

Rosemead, California
November 2013

Summary

- Information Technology Operating Unit (IT) forecasts capital hardware expenditures of $788.273 million for 2013-2017 and a total of $235 million in operation and maintenance (O&M) expenses[1] for Test Year 2015.
- The O&M 2015 expense level reflects required costs for the following:
    - Strengthening Cyber Security
    - Growth in Software License & Maintenance Agreements
    - Incremental O&M to support new capitalized software applications
- The capital expenditures will support hardware refresh, growth, disaster recovery, and regulatory requirements.
- IT provides support services that directly contribute to SCE's ability to deliver reliable electric service at a reasonable cost, while maintaining a safe work environment for our employees and complying with current and evolving laws and regulations.
- IT maintains thousands of miles of fiber optic cable and microwave communication paths in order to support SCE's business and data communications needs throughout its 50,000 square mile service territory.
- IT proactively prevents security incidents from disrupting business operations, while allowing employees, business partners, and other entities access to SCE over the Internet and other cyber gateways.
- IT faces major challenges, such as the evolving regulatory environment and the continued pace of technological change.

1 IT's O&M forecast reflects savings for supporting SCE's Operational Excellence (OpX) Goal as discussed in the Overview section of this testimony.

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I.

OVERVIEW

A. Summary of Request

This exhibit presents the test year 2015 forecast of Operation and Maintenance (O&M) expenses and capital expenditures of Southern California Edison's (SCE) Information Technology Operating Unit (IT). IT is responsible for the management of SCE's applications and technology infrastructure. The current technology environment includes approximately 63 large and midrange servers, 3 mainframes, 80,768 terabytes of storage, 3,900 miles of fiber cable, satellite communications, and over 150 microwave communication sites. SCE currently operates three primary data centers located in Rosemead, Irvine and Alhambra, California. IT currently employs 1,691 SCE employees and 1,764 contractors and serves approximately 20,000 users.[2]

1. Capital summary

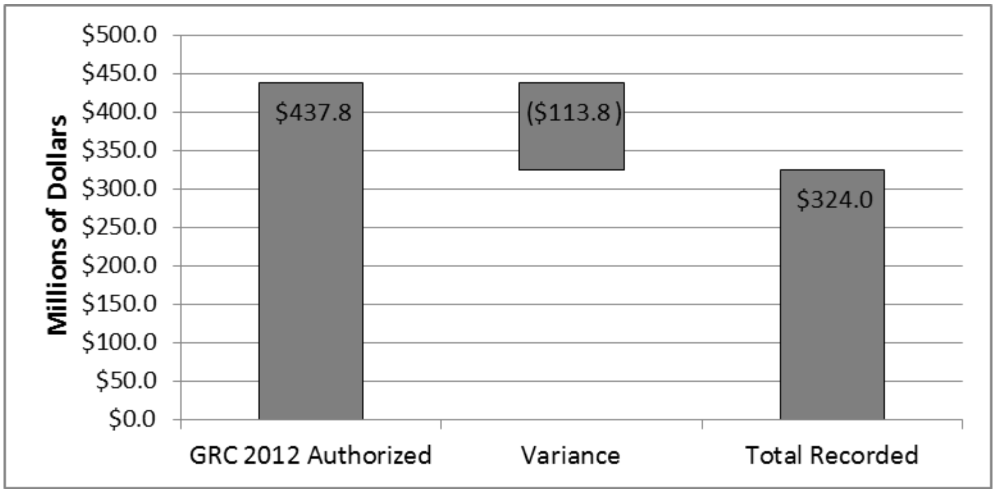
Table I-1 below summarizes our 2012 historical recorded capital expenditures and our forecast for 2013-2017.

Table I-1
SCE – IT Summary of Capital Request
(Nominal $000,000)

2012 Historical		SCE IT Capital Request 2013 through 2017					Total
Authorized	Recorded	2013	2014	2015	2016	2017	
$437.80	$324.00	$331.13	$328.52	$373.04	$385.88	$355.75	$1,774.32

[2] As of 12/31/12.

Figure I-1
2012 Capital GRC Authorized to Actual Recorded



As Figure I-1 above illustrates, IT's 2012 recorded capital expenditures were $113.8 million below the amount the California Public Utilities Commission (CPUC or the Commission) authorized in our 2012 GRC. Several factors influenced this variance including the initial impact of our Operational Excellence (OpX)[3] initiative as well as the uncertainty of the rate case decision which was adopted on November 29, 2012. Our current forecasts for 2013 and 2014 are significantly below the forecasts for these years in our 2012 rate case. Most of these reductions are attributable to our OpX initiative, which will reduce overall expenditures by focusing on prioritizing non-regulatory work in addition to streamlining our development and support practices.

2. O&M Summary

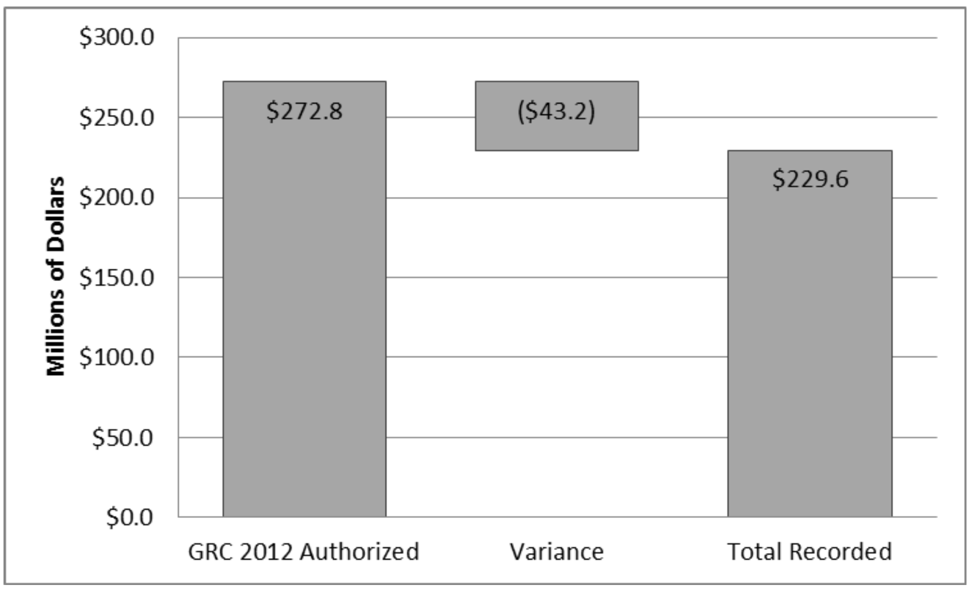
Table I-2 below summarizes our 2012 authorized and recorded (adjusted) O&M expenses and our 2015 forecast.

3 *See* Chapter I, Section I.B "Support For SCE's Operational Excellence (OpX) Goal" of this Overview for further discussion.

Table I-2
IT O&M Request for 2015
(Constant 2012 $000,000)

2012 Authorized	2012 Recorded/Adjusted	2015 Forecast
$272.80	$229.61	$234.88

Figure I-2
2012 O&M GRC Authorized to Actual Recorded



Again, as in the case of capital expenditures, in 2012 IT spent $43.2 million less than authorized for O&M primarily due to the uncertainty around the rate case decision. The 2015 forecast illustrates a similar focus on optimization and efficiency that will continue to result from our OpX efforts.

Support For SCE's Operational Excellence (OpX) Goal

In SCE's Policy testimony (SCE-01, Policy) SCE's President Ron Litzinger states:

> In this GRC, a significant impact of implementing an Operational Excellence framework can be seen in the significant reductions in O&M expenses, particularly in the Administrative and General (A&G) accounts. We have committed to reducing almost every area of A&G spending across the company. The most significant reductions have occurred in Information

> Technology, Human Resources, Financial Services, and Operational Services. While some of these reductions have been implemented in 2013, more are expected between now and the end of 2015 and those reductions are reflected in our test year estimates.[4]

SCE's continuing focus on Operational Excellence (OpX) provides a continuing mechanism to challenge our own internal processes and decisions to ensure we are making good investment decisions on behalf of our ratepayers. The IT organization plays a vital role in OpX as our expenditure on systems and support services have grown as a percentage of total company spend over the past 10 years. There are many reasons for this including:

1. Responding to the threat of cyber-attacks
2. Customer demand for usage information and more interactive services and automation
3. Regulatory demand for more information
4. Continuing deployment of smart devices on the grid
5. Increasing use of information technology throughout the enterprise
6. Network build outs to support expansion

IT's 2015 estimates reflect over $30 million[5] of operational savings resulting from a combination of headcount reductions together with implementing an expanded sourcing strategy.[6] The headcount reductions are the result of extensive efforts to streamline our operations, reduce redundancies, and prioritize our work. These savings are partially offset by approximately $1.7 million of severance for the impacted employees. Worksheets containing the calculation of these savings and offsetting costs can be found in workpapers to this volume.[7] These savings and costs are included in the impacted individual divisional O&M 920/921 FERC account sections of this volume.[8] SCE is proposing a 50/50 split of the anticipated savings for 2015. This savings mechanism both incentivizes SCE to continue to

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[4] *See* SCE-01, Policy, p. 6.

[5] This number is net of estimated sourcing costs.

[6] Sourcing is the common term used to describe working with a third party to take over part or all of a business function.

[7] *See* workpaper entitled "IT OpX Savings and Associated Costs."

[8] *Id.*

aggressively look for new ways to reduce costs as well as immediately reward the ratepayer with a reduced request. This type of shared savings has previously been supported by the Commission.[9]

As in the rest of SCE, IT continues to evaluate how we can better serve our internal customers and ultimately our ratepayers while reducing our overall expenditure. As will be seen in our request, many areas have moderated or even reduced their request as a result of our efforts. We will continue to look for areas where we can leverage cost reducing or automating technologies, for consolidation candidates,[10] and for additional savings opportunities.

One of the primary tools that SCE has implemented to allow us to better manage our technology spend is an enterprise prioritization methodology. We have developed a process and common set of tools that helps us prioritize spending by using SCE's strategic goals to measure the relative value of each potential project.[11] The process challenges each project not only on cost but also benefits (assuming that the projects are not mandated.) The result is a robust discussion and decision process that allows us to focus only on the truly important work that is required for the safe, efficient and cost effective operation of SCE.

B. The Continuing Challenge of Cybersecurity

Cybersecurity – the protection of SCE systems and data from cyber-attack – has become an increasingly important area of risk management for SCE. Like other companies, SCE is facing more frequent, more destructive, and more sophisticated cyber threats. Attempted attacks include computer viruses, intrusions by hackers into our network gateways, malicious emails containing "phishing" scams, and other exploits.

The Internet has allowed unprecedented access to information and has dramatically increased the speed at which information can be transmitted. While this has enabled tremendous increases in productivity, it has also led to security vulnerabilities. The growing dependence on mobile technologies and wireless communications has further exposed business systems to cyber threats. One of SCE's greatest strategic challenges is to provide timely, actionable warning of cyber threats through effective monitoring and alerting capabilities.

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9 D.91-12.076, "sharing the…savings between ratepayers and shareholders will provide a solid incentive to Edison to continue to vigorously pursue cost control goals."

10 Consolidation candidates are multiple versions of like applications that can be replaced with a single instance resulting in lower operating costs.

11 *See* workpaper entitled "Project Approval Process."

Cybersecurity is critical to the reliability and resilience of the nation's electric grid, including SCE's electric infrastructure. The same defense-in-depth approach SCE uses to protect its corporate network and systems is also being applied to the grid network to provide a flexible framework for improving cybersecurity defenses.

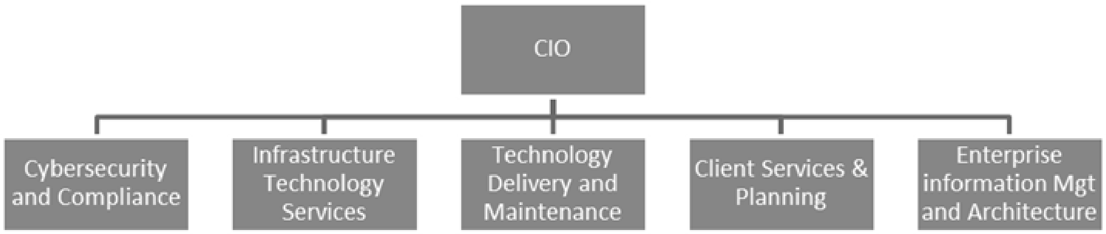
As SCE systems become more integrated and business critical, the importance of safeguarding them against cyber threat increases. As technology continues to advance, the complexity of security threats also continues to advance, and SCE's efforts to defend against them must also advance.[12]

C. Changes to the IT Operating Unit

The IT Operating Unit has undergone significant changes since the 2012 GRC case was filed. In addition to substantial leadership changes, the organization has been streamlined and simplified. The reason for this change was to re-establish the focus on our core work. Some of our de-centralized functions (e.g., finance, human resources, supply chain, safety) have been integrated back into their corporate functional areas. The corporate functional areas will provide IT those services in the future. The organization has been flattened and focused to allow for greater line-of-sight accountability, and there has been a reduction of internal support functions (pushing more self-service onto the managers), a reduction in management layers, and an overall simplification of our Operating Unit. We expect to continue to refine our organization over the next few years to improve our efficiency and effectiveness. The improvements we expect to achieve are reflected in our forecasts. The restructured and simplified organization is illustrated in Figure I-3 below.

[12] *See* SCE-05, Vol. 2, Chapter II "Cybersecurity & IT Compliance" for further detail.

Figure I-3
IT Operating Unit



We believe this new structure will allow for clearer lines of responsibility, eliminate possible redundancy, allow for better and quicker decision making, and increase organizational efficiency.

D. Commission directives from the 2012 GRC Final Decision

The Commission's 2012 GRC Decision[13] ordered SCE to address several items in this 2015 GRC. The following lists those directives as well as where they are addressed in our 2015 testimony.

1. A table listing capitalized software projects funded during 2010-2012, as identified in this GRC across all business units. The table shall include, for each project, SCE's final 2012 GRC forecast, as well as authorized and recorded expenditures. This table can be found in our workpapers.[14]
2. Information about whether SCE employs best industry practices in making its capitalized software project cost estimates, particularly as to in-house labor, project management and contingency. IT's project estimation methodology can be found in SCE-05, Vol. 1, Technology Delivery and Maintenance, section 3) Estimating Methodology and Forecast.
3. Information about how SCE is effectively optimizing experience and assets to minimize costs of software development and implementation. A discussion on this subject can be found in SCE-05, Vol. 1, Enterprise Information Management & Architecture, section 1.b) Optimization of Experience.

[13] D.12-11-051, pp. 435-436, also Ordering Paragraph 27.

[14] *See* workpaper entitled "Capitalized Software Projects Funded During 2010 - 2012 for ALJ Directive No. 1."

4. Information about how SCE is cost effectively planning its system design, including maximizing use of COTS and life extension activities, to meet growing demand for technology solutions. A discussion of this subject can also be found in SCE-05, Vol. 2, Enterprise Information Management & Architecture, section 1.b) Optimization of Experience.
5. Information about whether reasonable metrics are available to measure productivity results from IT solutions, and how such metrics would apply to SCE's 2015-2017 capitalized software projects. A discussion of this subject can also be found in SCE-05, Vol. 1, Client Services & Planning, section 1.b) Metrics Measuring Productivity Results from IT Solutions.

II.

OPERATIONS & MAINTENANCE (O&M) EXPENSES

A. Development of O&M Test Year Estimate

1. Historical Adjustments

SCE reviewed the recorded expenses for each division within the IT Operating Unit from 2008 through 2012. Recorded expenses were evaluated for cyclical or unusual expense patterns that were identified as non-recurring. These non-recurring activities were then removed from the recorded expenses. Historical adjustments may either increase or decrease the recorded costs, depending upon the nature of the adjustment.

2. Methodologies

The methodologies used to establish a basis for IT's 2015 Test Year O&M request for each division by FERC Account are based on guidance from the CPUC in D.89-12-057 as follows:

- Averaging: Where recorded expenses for a given division in a FERC Account have shown significant fluctuations from year to year, or are influenced by weather or other external forces beyond SCE's control, recorded expenses over a period of time (typically four years) are averaged to develop the 2015 Test Year base estimate;
- Trending or Last Recorded Year: Where recorded expenses for a given division in a FERC Account have shown a trend (rising, falling, or stable) over three or more years, the last recorded year (2012) of recorded expenses is used as the 2015 Test Year base estimate, plus or minus a detailed estimate of future costs and/or savings as appropriate; and
- Itemized Forecast: Where the 2015 Test Year base estimate is based on a detailed analysis of cost elements expected to be incurred in the Test Year.

SCE developed cost estimates by selecting one of the methodologies listed above to forecast each of the FERC Accounts within each division in accordance with CPUC guidance in D.89-12-057. In IT's Testimony for this GRC, the 2012 recorded expenses are used the most frequently as the base, adjusting upward for specific identifiable future cost increases or downward for specific decrements or productivity adjustments. A detailed explanation of each IT division, its associated historical expenses, and the 2015 Test Year request follows.

Table II-3
O&M Forecast Approach by Division
(by FERC Account)
(Constant 2012 $000)

O&M Expenses	FERC	Recorded/Adjusted 2012	Test Year 2015	Variance	Forecast Method	Drivers
INFRASTRUCTURE TECHNOLOGY SERVICES	Labor	48,588	38,762	(9,826)	LRY	OpX Savings and Severance Pay
INFRASTRUCTURE TECHNOLOGY SERVICES	Non-Labor	60,791	74,692	13,901	LRY	Software License Renewal
TOTAL O&M for INFRASTRUCTURE TECHNOLOGY SERVICES 920-921		109,379	113,454	4,075		
INFRASTRUCTURE TECHNOLOGY SERVICES FOR NUCLEAR	Labor	3,090	3,090	0	LRY	N/A
INFRASTRUCTURE TECHNOLOGY SERVICES FOR NUCLEAR (Net of Participant Credits)	Non-Labor	(17)	(17)	0	LRY	N/A
TOTAL O&M for INFRASTRUCTURE TECHNOLOGY SERVICES FOR NUCLEAR 517		3,073	3,073	0		
TOTAL O&M for INFRASTRUCTURE TECHNOLOGY SERVICES -NETWORK RENTS 931	Other	4,107	4,107	0	LRY	N/A
TECHNOLOGY DELIVERY & MAINTENANCE	Labor	41,100	31,274	(9,826)	LRY	OpX Savings and Severance Pay
TECHNOLOGY DELIVERY & MAINTENANCE	Non-Labor	18,960	17,669	(1,291)	LRY	OpX Savings and Severance Pay
TOTAL O&M for TECHNOLOGY DELIVERY & MAINTENANCE 920-921		60,060	48,943	(11,117)		
TECHNOLOGY DELIVERY & MAINTENANCE FOR NUCLEAR	Labor	3,844	2,067	(1,777)	LRY	SONGS Closure
TECHNOLOGY DELIVERY & MAINTENANCE FOR NUCLEAR (Net of Participant Credits)	Non-Labor	164	551	387	LRY	Reduced Participant Credits
TOTAL O&M for TECHNOLOGY DELIVERY & MAINTENANCE FOR NUCLEAR-517		4,008	2,618	(1,390)		
CYBERSECURITY & COMPLIANCE	Labor	5,254	7,529	2,275	LRY	Cyber Engineering workforce additons
CYBERSECURITY & COMPLIANCE	Non-Labor	1,224	11,494	10,270	LRY	Contracts for testing and tools
TOTAL O&M for CYBERSECURITY & COMPLIANCE 920-921		6,478	19,023	12,545		
ENTERPRISE INFORMATION MANAGEMENT & ARCHITECTURE	Labor	13,517	11,060	(2,457)	LRY	OpX Savings and Severance Pay
ENTERPRISE INFORMATION MANAGEMENT & ARCHITECTURE	Non-Labor	6,209	5,886	(323)	LRY	OpX Savings and Severance Pay
TTOTAL O&M for ENTERPRISE INFORMATION MANAGEMENT & ARCHITECTURE 920-921		19,726	16,946	(2,780)		
CLIENT SERVICES & PLANNING	Labor	19,267	15,440	(3,827)	LRY	OpX Savings and Severance Pay
CLIENT SERVICES & PLANNING	Non-Labor	3,514	2,376	(1,138)	LRY	OpX Savings and Severance Pay
TOTAL O&M for CLIENT SERVICES & PLANNING 920-921		22,781	17,816	(4,965)		
INCREMENTAL O&M FOR NEW SOFTWARE	Labor	0	5,222	5,222	IF	Various projects >$5M
INCREMENTAL O&M FOR NEW SOFTWARE	Non-Labor	0	3,682	3,682	IF	Various projects >$5M
TOTAL O&M for INCREMENTAL NEW SOFTWARE 920-921		0	8,904	8,904		
O&M GRAND TOTAL		229,612	234,884	5,272		

Forecast Method Level
LRY = Last Recorded Year
IF = Itemized Forecast
A3 = Three Year Average
A4 = Four Year Average
A5 = Five Year Average

B. Infrastructure Technology Services

1. Infrastructure Technology Services Division (ITS)

a) Infrastructure Technology Services

The primary purpose of the Infrastructure Technology Services Division (ITS) (formerly Infrastructure Operations Division) of SCE's IT Operating Unit is to provide reliable, responsive, and cost-effective operational IT products and services for more than approximately 20,000 SCE and contingent workers across SCE. At year-end 2012, ITS had 758 SCE employees and used 412 contractors.

ITS is comprised of the Automation Services, Computing Services, Service Operations, Grid Services and Service Management & Planning groups. These groups perform, operate, and maintain key infrastructure assets, products and services for SCE, including:

- Mainframe servers, midrange servers, disk and tape storage
- Cloud infrastructure and strategy
- Device engineering
- IT tools management
- Identity and access management
- IT Service Desk (Tier 1, Tier 2, and Tier 3 support)
- Incident management (desktop & single users – enterprise level)
- Executive & dedicated support
- Deployment and order fulfillment
- Customer bill printing/mailing operations
- Edison operators
- Command Center operations
- Voice/data/satellite network and telecommunications infrastructure
- Transmission and distribution grid control network
- Coordination of IT regulatory compliance
- Management of IT assets
- Development and management of IT service management processes

b) Automation Services Group

The Automation Services group in ITS is composed of several prior organizational groups brought together to drive organizational and process efficiencies by planning, building, deploying, and maintaining a collection of tools automating the business of IT. The four primary activities performed by Automation Services are:

- Device tools activities, which include the deployment, maintenance, and complete management of most desktop software applications,
- Identity and access management tools activities, which include the deployment, maintenance, and complete management of the identity management systems for IT,

- Application tools activities, which include the deployment, maintenance, and complete management of the tools IT uses to conduct business, such as Service Manager, Citrix, and BMC Remedy, and
- ManageWare[15] and collaboration tools activities, which include the deployment, maintenance, and complete management of most collaboration tools such as Lotus Notes.

Device tools activities include design and engineering of end-user devices including end user computer evaluation and configuration, software packaging and automated deployment, monitoring, trouble shooting and problem resolution, and maintenance in support of functional areas throughout SCE. Device tools solutions include support of end-user devices such as business laptops and desktops, ruggedized laptops, office shared printers, and mobile devices such as smart phones and tablets.[16] Finally, device tools activities include creation and configuration, packaging and deployment, and version management of operating systems, office productivity software, commercial off-the-shelf productivity software, and custom software.

Identity and access management tools activities include designing, engineering, building, implementing, deploying and maintaining identity and access management tools such as IBM Tivoli Identity Manager/Tivoli Access Manager as well as solutions that support Information Technology Infrastructure Library[17] process automation. Examples include centralizing the granting of access to applications and servers, and providing the capability to sign on one time to gain access to multiple systems. These teams perform problem analysis and resolution to minimize problem reoccurrence for these identity and access management tools and use these tools to grant access to many different systems.

Application tools activities include design, implementation, deployment, and maintenance of client virtual applications and desktops, DevOps,[18] application performance

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[15] ManageWare definition: ManageWare encompasses two major functions: (1) The monitoring capability of applications, servers, and network components that aid in the management of those components, and (2) The ability to remotely push software to networked devices and run reports on where our software is distributed.

[16] *See* workpaper entitled "Supported Devices 2013.pdf."

[17] *See* workpaper entitled "ITIL V3: Process Summary Sheets for PinkSCAN" for in-depth definitions and summaries of each ITIL process.

[18] DevOps solutions provide virtualized application sequencing deployment, and self-service provisioning into multiple environments.

management, and service management solutions. Client virtualization solutions provide infrastructure for hosting and managing virtualized desktops and applications that can be used with any end-point device platform, and enables SCE's "bring your own device" strategy. Application performance management tools enable performance and capacity monitoring, modeling, and planning at the application level. Service management solutions provide IT process automation tools such as IT call center and data center management tools.[19]

ManageWare and collaboration tools activities include design, implementation, deployment, and maintenance of collaboration and system management tools such as email, corporate instant messaging, and automated deployment and monitoring tools that operate 24 hours a day, seven days a week. These activities enable SCE to communicate to employees, vendors, customers, and other stakeholders. This includes managing information received from telecommunications equipment and data center equipment upon which IT groups can act to resolve equipment or application issues in a timely manner.

c) Computing Services Group

The Computing Services group in ITS manages and maintains SCE's mainframe servers, midrange[20] servers, disk and tape storage, and operating software. Computing Services activities include building a scalable and reliable applications infrastructure critical to enabling SCE's business operations and providing business continuity (disaster recovery) services 24 hours a day, and seven days a week. Computing Services focuses on providing the following:

- Server management
- Storage management
- Operating software management
- Business continuity services
- Cloud services
- Data center and sustainability services

[19] *See* workpaper entitled "ITIL V3: Process Summary Sheets for PinkSCAN" for in-depth definitions and summaries of each ITIL process.

[20] Midrange computers are a class of computers falling in the middle of the computing spectrum between mainframe computers and personal computers.

Server management activities include building, operating and maintaining a secure server environment to run critical business applications. Examples include building servers in support of projects, maintaining server health by applying patches as required by vendors to resolve production problems, performing problem analysis and resolution to minimize problem reoccurrence, and providing ongoing disaster recovery services.

Storage management activities include disk and tape storage installation and support services to meet company-wide business requirements. For example, evaluating various disk and tape storage options on the market and selecting the solutions which meet our business requirements for mainframe and midrange computing platforms.

Operating software management activities include database and transaction system installation and support services to meet client requirements. For example, providing database tools and support for mainframe server databases, such as DB2, and Oracle and Microsoft SQL server databases on midrange servers.

Business continuity services include installing, monitoring and maintaining data backup capabilities and supporting client data restoration requirements.

Computing Services also supports SCE's private cloud services.[21] The primary responsibility of SCE's private cloud services is to reduce time and cost to build SCE business solutions, to test and to implement key applications. In addition, SCE's private cloud services promote the use of a standard catalog of services to simplify and maintain the currency of SCE solutions and products.

SCE data centers in Rosemead, Irvine and Alhambra are also supported by Computing Services. Functional responsibilities of Computing Services for the data centers are in two key areas: (1) IT data center hardware infrastructure facility management; and (2) IT data center and hardware capacity utilization management.

The IT data center hardware infrastructure facility management function is performed in close collaboration with the Corporate Resources group of the Financial and Operational Services Operating Unit (F&OS) as it relates to ongoing data center operations. Overall, this is an

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[21] Definition: Cloud computing is a general term for delivering hosted computing services over the internet or intranet. These services are broadly divided into three categories: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS). A cloud can be private or public. A public cloud is available to the general public on the Internet. A private cloud is a proprietary network or a data center that supplies hosted services to a single client.

integrated facility management function to ensure ongoing, continuous (24x7 basis), reliable operation of SCE's critical production data centers.

The IT data center and hardware capacity utilization function measures, reports on and allocates data center space, power and hardware resources to ensure the most cost effective and efficient utilization of SCE data center assets.

d) Grid Services Group

The Grid Services group in ITS is responsible for designing, engineering, installing, operating, monitoring, repairing, and maintaining the voice, data, and satellite networks for SCE. This includes the hardware (such as fiber optic cable, copper cable, circuits, switches, routers, microwave transmission towers, and radio communication devices), the internal software that operates the equipment, and the software for monitoring the voice and data networks. Grid Services is responsible for SCE's vast communications network that includes over 3,900 miles of fiber optic cable, over 150 microwave communication sites, nearly 30,000 telephones and related equipment, a dispatch radio system that supports over 4,800 mobile radios, nearly 47,000 NetComm radios,[22] over 1,000 sites with telephony,[23] and over 300 sites that have a Wide Area Network and Local Area Network connectivity.[24]

The voice and data network enables essential communications among our employees across the company, and includes communications systems for (1) dispatching personnel to restore electric service and activate new service for our customers, (2) operating and maintaining the transmission grid, (3) substation automation, and (4) communicating with our customers. Grid Services manages, operates, and maintains SCE's communications networks to ensure that the communication infrastructure is available 24 hours a day, 365 days a year. Grid Services also designs, engineers, and integrates new technologies into our existing communications networks such as Voice over IP (VoIP) and video streaming.

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22 *See* workpaper entitled "NetComm Radios" for more information on SCE's NetComm system.

23 *See* workpaper entitled "Telephony Sites."

24 WAN/LAN definition: A wide area network (WAN) is a computer network that covers a broad area (i.e., any network whose communication links cross metropolitan, regional, or national boundaries. A local area network (LAN) is a computer network covering a small physical area, like an office or small groups of buildings. The defining characteristics of LANs, in contrast to WANs, include their usually higher data-transfer rates, smaller geographic area, and the lack of need for telecommunication lines.

Given SCE's large service territory and diverse types of work, it is necessary to support several means of communications to enable SCE's employees to perform their responsibilities, including:

- Transportation of data between various locations within SCE's service territory
- Grid automation
- Employee telephone and voice-mail systems
- Wireless voice dispatch and mobile data to employees working in the field
- Broadband remote access to mobile employee base
- Video conferencing
- Internet presence
- Satellite operations

These modes of communication help SCE deliver reliable electric service by transporting data such as amps, watts, transformer temperature, and ambient temperature throughout SCE's service territory to business unit operators, management, planners, and engineers. In this way, SCE is able to monitor the transmission and distribution grid in real-time as necessary to provide safe and reliable service to our customers.

Grid Services also performs repair functions to critical communications networks. Outages of these networks are categorized as critical and must be repaired shortly after an outage is reported. Grid Services is responsible for maintaining the ability to continue communication with field command centers by way of mobile radio until the critical communication network service is restored.

Grid Services responds to trouble calls concerning SCE's communications networks. This group also performs preventive maintenance on the voice and data network, and installs components such as fiber optic systems, microwave systems, and telecommunication cable systems, as well as installs and maintains the individual devices on our communications network, such as mobile radios and telephones. Grid Services also provides a dedicated support team for our San Onofre Nuclear Generating Station (SONGS), which performs activities similar to the larger Grid Services group.

Grid Services monitors the Energy Management System (EMS) alarms to inform grid operators when a power line becomes overloaded or when a circuit breaker opens due to an abnormal condition. EMS allows the Grid Operator to remotely perform critical functions such as opening and closing circuit breakers to energize or de-energize a line, monitoring load, and gathering timely information related to system conditions and reliability. EMS also collects transmission and generation related data and transmits this data to the California Independent System Operator (CAISO) every four seconds. Access to this real-time status information allows the ISO and SCE to effectively coordinate grid operations as required to operate the transmission and distribution infrastructure within safe physical limits.

Finally, Grid Services maintains the Distribution Management System (DMS) which enables grid operators to monitor and remotely control specific equipment not included within the scope of EMS such as pole switches and capacitors located on the distribution system. Automating this equipment and providing operators with remote control capability greatly facilitates Transmission & Distribution's (T&D's) ability to reduce outage time for its customers.

e) Service Operations Group

The Service Operations group in ITS is responsible for over 23,500 personal computers (PCs) and over 15,300 wireless communication devices (BlackBerrys, Cellphones, Pagers).[25] In addition, Service Operations monitors our mainframe servers, midrange servers, disk and tape storage, and applications along with SCE's vast communications network that has Wide Area Network and Local Area Network connectivity. This group also supports customer bill printing and mailing. Service Operations also provides operator services for handling incoming phone calls. Service Operations provides these services through six key activities:

- IT Service Desk
- Executive & Dedicated Support
- Deployment and Order Fulfillment
- Customer Bill Printing/Mailing Operations
- Edison Operators
- Command Center Operations

The IT Service Desk provides a single point of contact for company-wide support of end-to-end service restoration. The Service Desk is a 24 hours a day, 365 days a year operation (leveraging the Data Operations Command Center[26] (DOCC) group for afterhours coverage).[27] The IT

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25 *See* workpaper entitled "Wireless and PC Counts."

26 *See* workpaper entitled "DOCC Description of Duties."

27 After hours coverage is 6pm to 6am, Monday through Friday and 24 hours on weekends and holidays.

Service Desk is comprised of three Tiers (of services/support): Tier 1 handles more than 24,000 calls per month[28] from employees needing help with PC software, PC hardware, related peripherals and accessories, mainframe applications, distributed computing applications, network problems, phones, pagers, and mobile radios. Unresolved issues are escalated to Tier 2 and, if necessary, dispatched for on-site service to replace or modify hardware and software to restore operational status. Tier 3 is the final stage for resolution of all remaining incidents.

The operational goal of the IT Service Desk is to answer calls in a timely manner, restore service for 70 percent of incidents upon first contact, and to restore operational status within 6 hours.[29] The IT Service Desk also delivers proactive capabilities such as training and knowledge document creation to enable more efficient incident restoration.

Executive Support provides direct support for executive management and their assistants. The Dedicated Support group provides dedicated incident management, order fulfillment, and product deployment support to Operating Units that perform SCE critical business functions (such as the Law Department). Both Executive and Dedicated Support serve as a single point of IT contact for their clients.

The Deployment and Order Fulfillment capability focuses on the annual refresh and recovery of end-of-life PCs and network connected printers, and the fulfillment of more than 4,800 customer orders per month.[30] These orders are for approved standard adjustments to hardware, software, and accessories for personal computers and wireless communication devices. Additionally, orders for access to facilities and applications make up a third of the total monthly volume.

The Customer Bill Printing and Mailing Operations activities include printing, inserting, reconciling and mailing 250,000 bill statements, letters, and checks per day. High volume printers and bill inserters provide automation for the customer bill printing and mailing operation.

The Edison Operators are responsible for SCE's telephone directory assistance and handle about 46,000 calls per month, providing call assistance to external sources such as vendor companies, media, government officials, customers, emergency services (police & fire departments), and employees. The Edison Operators also perform after hour callouts during emergencies that require

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[28] *See* workpaper entitled "Call Management Volume."

[29] Actual Service Levels are 70% of incidents resolved upon first contact and 80% incidents resolved within six hours.

[30] *See* workpaper entitled "Order and Request Fulfillment Volume."

assistance from divisions in other Operating Units (OU) such as Corporate Facilities within the Financial & Operational Services OU, Local Public Affairs within the External Relations OU, Environmental Health & Safety, Business Resiliency, and Crisis Management Council Advisor, within the Safety, Security & Compliance OU, and Claims within the Law OU.

Command Center Operations monitors the SCE network, telephony systems, computing systems, and applications that are necessary to support SCE's key business processes. These environments are monitored from Rosemead and Irvine on a 24x7 basis. This group coordinates activities with technicians, subject matter experts, and management to expedite service restoration.[31] The group also communicates the status of IT systems through daily logs, event pages, and emails. In addition to monitoring, this group is responsible for dispatching repair crews, tracking and isolating service failures, managing service outages and trouble calls, monitoring environmental conditions at key IT facilities (i.e., power and temperature), and other activities such as responding to mobile radio emergency calls, essential for SCE to maintain safe and reliable service for our customers. Command Center Operations also negotiates outage windows and obtains approvals for changes to SCE's IT infrastructure. This is accomplished by analyzing and identifying impacts causing interruptions to transport systems, circuits and other IT services that may impact SCE business operations.

f) Service Management and Planning Group

The Service Management and Planning group (SM&P) in ITS is responsible for improving the quality, performance and reliability of IT's services. By improving the overall cost effectiveness and utility of our IT applications, SM&P allows SCE's Operating Units to rely on IT to deliver the business systems they need to efficiently conduct business.

Modeled along industry best practices such as those described in ITIL V3,[32] SM&P has the overall responsibility for the development, support and maintenance of the IT service management processes. The primary ITIL processes within scope for SM&P include responsibility for Service Asset and Configuration Management, Release Management, Demand Management, Capacity

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[31] *See* workpaper entitled "Service Restoration Triage Process."

[32] ITIL Definition: The Information Technology Infrastructure Library (ITIL) is a set of practices for IT service management (ITSM) that focuses on aligning IT services with the needs of business. In its current form (known as ITIL 2011 V3 edition), ITIL is published in a series of five core publications, each of which covers an ITSM lifecycle stage. ITIL describes processes, procedures, tasks and checklists that are not organization-specific, used by an organization for establishing integration with the organization's strategy, delivering value and maintaining a minimum level of competency.

Planning, Service Catalog, Problem Management, IT Service Continuity Management, and overall ITIL process strategy and governance.[33] SM&P provides support services to other ITS groups such as collection, analysis and reporting on key operational performance and service level indicators.

This group also ensures appropriate internal and external regulatory compliance requirements are met and integrated within the overall IT strategy. The sources of these requirements span from the North American Electric Reliability Corporation Critical Infrastructure Program (NERC CIP), Federal Energy Regulatory Commission (FERC) and Sarbanes-Oxley (SOX) to internal SCE audits.

SM&P also manages and maintains the budget for all IT software assets throughout their lifecycle. This consolidated management of software license and maintenance contracts, previously distributed among multiple IT groups, enables increased efficiency and price optimization with our software suppliers.

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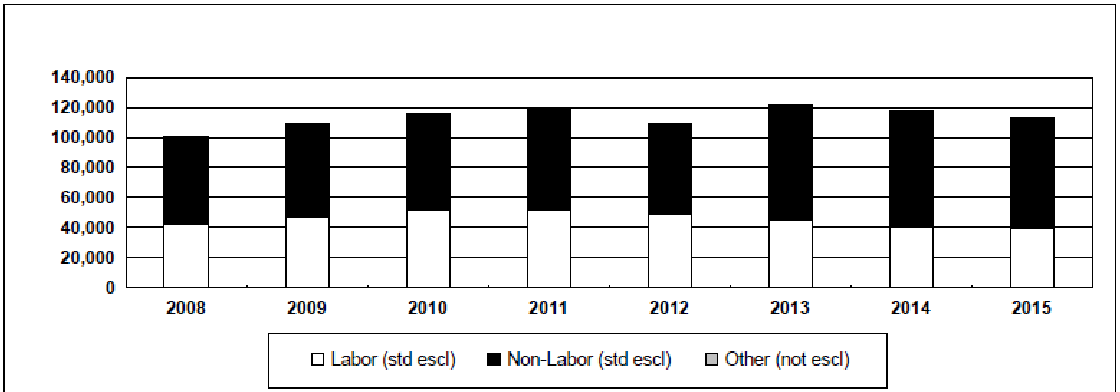
[33] *See* workpaper entitled "ITIL V3: Process Summary Sheets for PinkSCAN" for in depth definitions and summaries of each ITIL process.

2. Analysis of Operations & Maintenance Expense by FERC Account

a) FERC Account 920/921 – ITS

Figure II-4
Summary of Operations – Infrastructure Technology Services
Accounts 920/921 by Labor/Non-Labor/Other
Recorded and Adjusted 2008-2012/Forecast 2013-2015
(Constant 2012 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	42,373	47,083	52,184	52,167	48,588	44,731	40,306	38,762
Non-Labor	58,043	62,036	63,716	67,944	60,791	76,503	77,236	74,692
Other	0	0	0	0	0	0	0	0
Total	**100,416**	**109,119**	**115,900**	**120,111**	**109,379**	**121,234**	**117,542**	**113,454**

← Forecast → (2013–2015)

(1) Analysis of Recorded Cost

(a) Labor Expense

As shown in Figure II-4 above, labor expenses for IT's Infrastructure Technology Services (ITS) division increased in 2009 by $4.710 million or 11 percent over 2008 recorded. This increase is largely attributed to increased staffing in the Computing Services group.

In 2010 labor expenses increased by 11 percent ($5.101 million) due to additional staffing across ITS to fill open requisitions in understaffed groups to handle the increasing complex and growing infrastructure environment. From 2011 to 2012, ITS experienced no significant labor cost fluctuations.

(b) Non-Labor Expense

From 2008-2011, ITS experienced no significant fluctuations in non-labor expense. The 2012 recorded non-labor spend for ITS was $60.791 million compared to

$67.944 million for 2011. This 11 percent (or $7.154 million) reduction is primarily due to changes in ITS software license costs.

In 2012 the ITS software license cost was reduced by $2.959 million due to optimization of usage, savings in vendor software costs as a result of re-negotiation of three multi-year contracts, and savings due to retirement of various software products. Additional purchases were postponed due to the delayed 2012 rate case decision.

(2) Estimating Methodology and Test Year Forecast

Table II-4
Comparison Table for FERC Account 920/921
Recorded/Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 48,588	$ 38,762	$ (9,826)	OpX savings
Non-Labor	$ 60,791	$ 74,692	$ 13,901	Additional Software License Maintenance costs
Total	$ 109,379	$ 113,454	$ 4,075	

(a) Labor Expenses

For 2015 we forecast the labor expenses to be $38.762 million, which is a reduction of $9.826 million from the 2012 recorded expenses. Although historical recorded data indicates an averaging methodology would most closely follow the Commission's guidance, we have chosen the last recorded year as it best represents the basis for expenses we anticipate beginning in 2015. Additionally, our 2015 labor request is approximately $10 million lower than last recorded. Our 2015 labor request reflects both OpX savings and partially offsetting severance pay as described in Chapter 1, section B of this testimony.[34]

(b) Non-Labor Expense

For our non-labor forecast for test year 2015, there is an increase of $13.901 million over 2012 recorded expenses due to increases in software licenses and maintenance agreements. This is partially offset by OpX savings as discussed in the Overview section of this Volume. Historical recorded data indicates an averaging methodology would be an appropriate basis for a forecast of non-labor expenses and would produce a higher base year than last year recorded. However, we have chosen the last recorded year as it is most representative of our 2012 non-labor

[34] *See* Section B. Support For SCE's Operational Excellence (OpX) Goal of this Overview.

operating expenses and the most transparent explanation for anticipated increases for 2015. We adjusted the forecast based on anticipated increases to software license and maintenance expenses primarily driven by the renewal of expiring capitalized software maintenance contracts.

This increase is driven by the increase of software license and maintenance expenses previously approved in rate cases by the CPUC for capitalized software. Typically, capitalized software acquisitions include five years of license and maintenance support as part of the initial acquisition. At the conclusion of five years, when these contracts come due for renewal, maintenance agreements must be renewed as an operating expense. The maintenance support provides software error fixes, security patches, product enhancements and ongoing technical support for many business critical applications such as:

- SAS (Statistical Analysis System) for enhanced enterprise analytics,
- Power procurement software through vendor PCI,
- Edison SmartConnect® operating software through vendors Zones, Oracle, Edge Solutions and ITRON, and
- IBM's Rational software to support virtualization efforts, among others.[35]

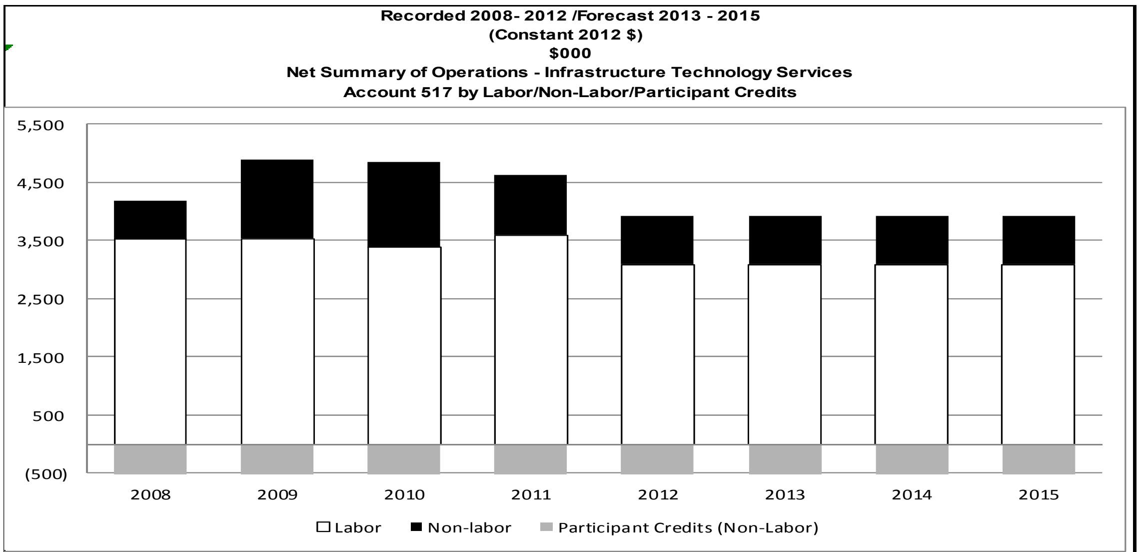
For test year 2015, we forecast non-labor expenses at $74.692 million, an increase of $13.901 over 2012 recorded expenses. This increase is due to software license and maintenance expenses for capitalized software projects entering into the capitalized five-year maintenance and support period, as well as growth in the number of licenses and escalation of the cost of existing licenses.[36]

[35] *See* workpaper entitled "Software License and Maintenance Five Year forecast."

[36] *Id.*

b) FERC Account 517—Infrastructure Technology Services

Figure II-5
Summary of Operations –ITS Support for Nuclear
Account 517 by Labor/Non-labor/Other
Recorded 2008-2012 /Forecast 2013-2015
(Constant 2012 $000)



	Adjusted/Recorded					Forecasted		
	2008	2009	2010	2011	2012	2013	2014	2015
Labor	3,519	3,537	3,376	3,590	3,090	3,090	3,090	3,090
Non-labor	668	1,363	1,466	1,036	839	839	839	839
Participant Credits (Non-Labor)	(862)	(1,056)	(1,048)	(991)	(856)	(856)	(856)	(856)
Total	3,325	3,844	3,794	3,635	3,073	3,073	3,073	3,073

Analysis of Recorded Cost

(a) Labor Expense

From 2008-2011, ITS experienced no significant fluctuations in labor expense. The 2012 recorded labor was $3.090 million compared to $3.590 million for 2011. This 14 percent (or $0.500 million) reduction is primarily due to reductions in labor cost for the Device Tools group in the ITS Automation Services group in support of SONGS.

This reduction was a result of increased enterprise standardization in the creation and configuration, packaging and deployment, and version management of operating systems, office productivity software, commercial off-the-shelf productivity software, and custom software.

(b) Non-Labor Expense

All non-labor expenses for SONGS are net of participant credits. SONGS participant credits are expense offsets received from the minority owners of SONGS that represent their proportionate share of O&M expense billed by SCE.[37]

The ITS non-labor expense fluctuated over the five-year period 2008-2012. In 2009 we saw a 258 percent – or $0.501 million – increase from 2008. In 2010, non-labor expense remained relatively flat. In 2011 ITS realized a 90 percent reduction in non-labor expense. Finally, ITS realized an additional 138 percent reduction in non-labor expense in 2012 compared to 2011 recorded.

In 2009 the two primary attributing factors for the $0.501 million increase were additional software expense in the Technology Delivery and Maintenance (TDM) division of IT and increases for additional support in the Network Operations group in the Grid Services group within ITS. The primary driver for the increase in non-labor expense for TDM software was expenses paid to an asset performance management software company, Ivara. One of the primary drivers for the increase in non-labor expense for the Network Operations group in 2009 was growth in temporary resources to backfill project resources assigned to the ERP program and to the SONGS Lotus Notes program.

In 2011 the 90 percent (or $0.373 million) reduction in non-labor expenses was attributed primarily to reductions in TDM software expenses. The primary drivers for the decrease in non-labor expense for TDM Software for FERC account 517 include decreased expenses for Sybase business intelligence software and decreased expenses for Business Genetics analytics software.

In 2012 the 138 percent (or $0.062 million) reduction in non-labor expense was attributed primarily to reductions in TDM Software contracts and reductions in IT Service Desk support cost. The primary drivers for the decrease in non-labor expense for TDM Software for 517 include refunds for services not rendered for Sybase business intelligence software and decreased

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[37] SCE is the operating agent and majority owner of the San Onofre Nuclear Generating Station (SONGS). SCE owns 78.21 percent of SONGS with San Diego Gas & Electric (SDG&E) and the City of Riverside sharing in the remaining 21.79 percent. Since SCE is the majority owner and operating agent for SONGS, SCE bills the minority participants for their share of costs to operate these facilities. The amounts billed to the participants are recorded as credits (1.2., contra expense).

expenses for Business Genetics analytics software. Additional reductions were realized as a result of cancelling the vendor IT service desk support contract and performing this work with SCE employees.

(2) Estimating Methodology and Test Year Forecast

Table II-5
Comparison Table for FERC Account 517
Recorded/Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 3,090	$ 3,090	$ -	N/A
Non-Labor	$ (17)	$ (17)	$ -	N/A
Total	$ 3,073	$ 3,073	$ -	

(a) Labor Expenses

For 2013-2015 we forecast labor expenses of $3.090 million, equal to 2012 recorded. Because labor expenses have fluctuated from year to year, the averaging methodology would have been appropriate for forecasting this area. However, although averaging would have produced a higher base year forecast, we have selected the last recorded year, which adequately represents our labor cost needs for the test year.

(b) Non-Labor Expenses

For 2013-2015, we forecast non-labor expenses of $(17) thousand, which is flat from 2012 recorded. This number represents an expense of $839 thousand with a participant credit[38] of $856 thousand resulting in a net non-labor request of $(17) thousand. Because non-labor expenses have fluctuated from year to year, the averaging methodology would have been appropriate for forecasting this area. However, although averaging would have produced a higher base year forecast, we have selected Last Year Recorded as it represents a more accurate 2012 operating expense base from which to project our 2015 test year. For test year 2015, we project that the 2012 recorded expense levels adequately represent the needs of our non-labor cost for the test year.

c) FERC Account 931- Infrastructure Technology Services

Activities recording to FERC account 931 are associated with facility rents and leases, and communication circuit leases that the Network Services group within Grid Services in ITS incurs in support of our communications network. For example, we rent space from government

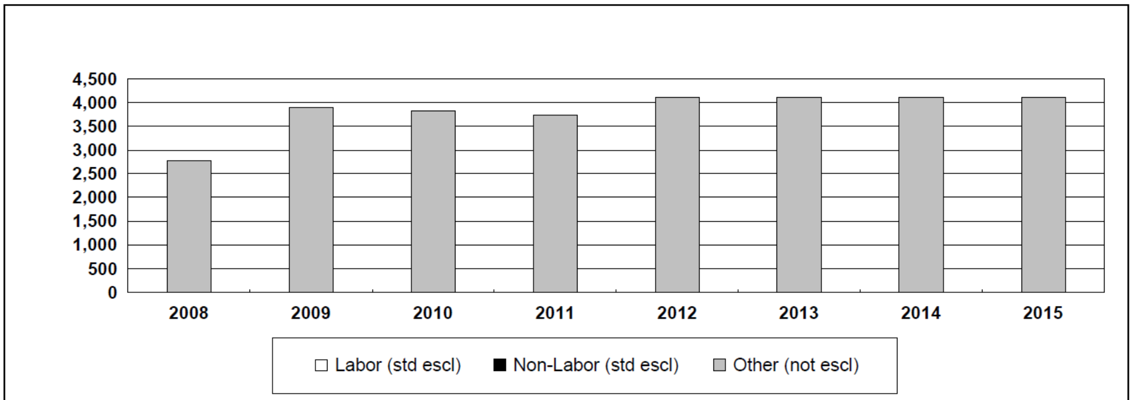
[38] Participant credits are credits billed back to SONGS partners for their agreed to share of costs.

agencies, private parties, and other public utilities so that we have the necessary space to install our communications hardware such as radio control devices, antennae, and microwave transmission equipment, throughout our service territory. The rented space can be in the form of a communication building, tower, and/or land. These activities allow for voice and data communications needed to support SCE electronic operations and permit employees to communicate and conduct daily business activities with SCE resources, vendors, and customers.

The costs associated with rents are a function of our lease terms and of the prevailing real estate market for these types of venues. We will continue to rely on facilities located throughout SCE's service territory to support our communications networks.

FERC Account 931 also includes costs to lease communications circuits from outside vendors, such as AT&T, Sprint, and Verizon. We require these leased circuits to provide network connections in those areas of our service territory where it is not feasible to install our own communication equipment.

Figure II-6
Summary of Operations – Infrastructure Technology Services – Rents
Account 931 by Labor/Non-labor/Other
Recorded 2008-2012 /Forecast 2013-2015
(Constant 2009 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	0	0	0	0	0	0	0	0
Non-Labor	0	0	0	0	0	0	0	0
Other	2,786	3,896	3,819	3,727	4,107	4,107	4,107	4,107
Total	**2,786**	**3,896**	**3,819**	**3,727**	**4,107**	**4,107**	**4,107**	**4,107**

← Forecast →

(1) Analysis of Recorded Cost

(a) Other Expenses

All of the costs recorded to FERC Account 931 by Network Services are classified as "Other" because they are rents and leases and are not subject to labor and non-labor escalation. However, costs can fluctuate because certain landlords, such as the Bureau of Land Management and the United States Forest Service do not bill on a monthly or annual basis, but rather in greater intervals (e.g., every two years or more). As such, variances can occur from year to year.

In 2009 we recorded $3.896 million in Other expense, a 40 percent increase from 2008 recorded. The primary driver for this increase was the transfer of cost into the Grid Services group within ITS from the Transmission & Distribution Operating Unit (T&D) for satellite communications.

From 2010 to 2011, there were no significant fluctuations in FERC account 931. The 10 percent increase from 2011 to 2012 is attributed to increased costs associated with Edison SmartConnect®, such as increased leased circuits and checkpoint firewall maintenance.

(2) Estimating Methodology And Test Year Forecast

In D.89-12-057, the CPUC stated that for those accounts which have shown a general trend, last year recorded is an appropriate methodology. Although there were some small fluctuations from 2009-2012 due to the inconsistent nature of the billings for both the leased sites and leased circuits, there is still a general flat to upward trend. Therefore last recorded year is the most appropriate methodology for base year calculation. We forecast $4.107 million for Other expenses for test year 2015, which is no change from 2012 recorded costs.

Table II-6
Comparison Table for FERC Account 931
Recorded/Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Other	$ 4,107	$ 4,107	$ -	N/A
Total	$ 4,107	$ 4,107	$ -	N/A

(a) Other Expenses

For 2015 we forecast Other expense to be $4.107 million, which is no change from 2012 recorded.

C. Technology Delivery & Maintenance Division

1. Technology Delivery &Maintenance Division (TDM)

a) Description of Activities

The Technology Delivery and Maintenance Division (TDM) in IT is responsible for the delivery, maintenance, operations, and end user support for all application systems. This includes providing support for software fixes, enhancements, interfaces, and reporting to meet business operations and information technology needs for SCE. In addition, TDM supports all phases of information technology project implementation including planning, analysis, design, configuration, construction, quality control, testing, and implementation.

TDM's primary function is to support all of SCE's Operational Units by solving business problems with information technology solutions. TDM's activities are all traditional "IT" type responsibilities, which include delivering, testing, and maintaining systems for all Operating Units within SCE. Technology, however, continues to change rapidly—the use of information technology has moved beyond isolated problem-based applications to the point where it is now the platform on which all business transactions take place. At SCE, this has meant infusing intelligence into systems and processes. Such changes have necessitated significant investments in licensing, hardware, software, and personnel. These investments have allowed existing staff to handle larger volumes of work, improve safety and reliability, replace aging infrastructure, and engage customers in such issues as energy conservation and environmental sustainability.

b) Technology Solutions by Operating Unit:

The precise application of information technology to support SCE's business processes and procedures is critical to enabling energy to flow to our customers adequately, reliably, and securely. The following paragraphs describe many of the systems supported by TDM to enable and support SCE's individual Operating Units in pursuit of these goals.

(1) Enterprise Asset Management Solutions Group

The Enterprise Asset Management Solutions (EAM) group in TDM provides functionality for all Operating Units, and provide support to the entire enterprise regarding asset management, work management, and environment health and safety processes. The EAM group provides technology services and solutions that enable asset and work management business functions including work initiation, planning, scheduling, execution, and closure capabilities; project and program management capabilities; asset maintenance and life-cycle planning; organization and tracking of asset attributes; and integration of other enterprise processes (such as supply chain, finance, document management, and human resources) in the work execution processes. Activities include assessing proposed changes to processes, making recommendations, initiating procurement of solutions, performing configuration of those solutions, and supporting application systems.

Applications within this solution area include:

- SAP Plant Management
- SAP Project Scheduling
- SAP Portfolio & Project Management
- ActionWay for SONGS' Corrective Action Program
- ClickSoft scheduling for Transmission and Distribution Operating Unit's dispatching of work
- Monitoring Asset Reliability System (MARS)/Computerized Asset Management Systems (CAMS) for generation asset reliability management

The work management solutions and systems manage the initiation, planning, scheduling, and execution of work conducted to maintain the electric grid infrastructure. The asset management solutions and systems track and maintain information related to the location, age, design characteristics, inspection, maintenance and operating statistics, installation, removal, replacement and salvage of physical assets.

The environmental, health and safety solutions and the environmental services solutions help SCE remain compliant with environmental health and safety regulations such as gasoline storage and dispensing tracking, injury-incident reporting, and environmental health and safety auditing. Applications included are Environmental Information Management and Environmental Health & Safety Compliance Management.

(2) Supply and Operations Solutions Group

The Supply and Operations Solutions group in TDM consists of Supply Chain Management, Transportation Services, and Corporate Resources applications that support all of SCE. Supply Chain Management provides procurement, material management, and document/records management capabilities. For suppliers, the Supplier Relationship Management function of the Supply and Operations solutions provides the capability for enhanced purchasing activities including requests for quotes, requests for proposals and requests for information from vendor. It has also allowed for automation of routine procurements through the use of catalogs and shopping carts. The application has been designed to work in concert with SAP's material management module, which is the system of record where purchase orders, agreements and master data are stored. In addition, the suppliers have a self-service portal function that provides the ability for receiving purchase orders, entering time worked, and entering invoices.

Transportation Services and Corporate Resources functions of the Supply and Operations Solutions group allow SCE to transport the resources and equipment and build the facilities needed to generate, transmit, and distribute electrical power to support the needs of its customers.

(3) Human Capital Management and Compliance

The Human Capital Management and Compliance Solutions group provides human resources (HR) functionality and compliance functionality across SCE’s Operating Units. This group provides support for systems that perform HR functions including employee call center capabilities, recruiting, onboarding and administration of employee events, employee training and development, performance development planning, compensation management, succession planning, employee benefits, time entry and payroll processing. These applications support and enable the Human Resources and Payroll Divisions of the Financial and Operational Services Operating Units to deliver the business processes described above, in compliance with operating and reporting regulations mandated by federal, state, and local agencies.

This team also supports systems that perform compliance functions for all Operating Units, such as segregation of duties; risk management; compliance with legislations such as Sarbanes-Oxley and NERC CIP; safety and risk mitigation; protecting employees, assets, information and customer interests; and ensuring a safe and secure work environment.

The support for all human resources and compliance application systems includes assessing proposed changes, making recommendations, initiating procurement of solutions, performing configuration, and support.

(4) Energy – Nuclear Solutions Group

The resources within the TDM Energy Solutions group assess, recommend, develop, procure, install, and support application systems for the Nuclear and Power Supply Operating Units. This includes providing integration services between custom solutions, procured applications and the SAP Enterprise Resource Planning (ERP) system. The applications that directly support the San Onofre Nuclear Generating Station (SONGS) are included within this portfolio of applications.

These applications support and enable SONGS staff to safely operate the nuclear facility, as well as to assist in complying with specific operating and reporting measurement and documentation regulations mandated by the Nuclear Regulatory Commission, the State of California, and local agencies. Application examples include safety tagging systems, radiation health physics systems, access controls systems, and qualification management systems. These applications support the safe, compliant, and efficient operation of SONGS. Several existing applications were migrated to the ERP system, but the need for specialized services and business automation to support the safe and efficient operation of SONGS has continued.

(5) Energy – Non Nuclear Solutions Group

The Power Supply Operating Unit and the Risk Control Division of the Finance & Operations Support Operating Unit use systems supported by TDM for making power procurement decisions and for managing the SCE-owned energy resources that service customer load.

These systems facilitate the energy procurement planning, purchasing, scheduling, dispatching, metering, and settlement functions needed to meet customer load requirements. Should these systems become unavailable, it would significantly impair Power Supply's ability to service customer load and comply with regulations such as the CPUC's "least cost dispatch"[39] mandate. According to the 2010 LTPP proceeding R.02-12-074, **8.A.4. Prudent Administration of Contracts:**

> **Rule:** The utilities shall prudently administer all contracts and generation resources and dispatch the energy in a least-cost manner. (CPUC SOC 4)
>
> **Discussion of Rule:** Prudent contract administration includes administration of all contracts within the terms and conditions of those contracts, including dispatching dispatchable contracts when it is economical to do so. In administering contracts, the utilities have the responsibility to dispose of economic long power and to purchase economic short power in a manner that minimizes ratepayer costs.[40],[41]

SCE implemented the Market Redesign and Technology Upgrade (MRTU) program in 2009. This program is designed to create a power grid that is more reliable, more efficient, and more transparent—objectives that required significant technological adjustments on SCE's part. These changes included the replacement of several key Power Supply applications. One of the major initiatives was the implementation of the Power Costs Inc. (PCI) suite of applications: GenTrader, GenManage, GenPortal and its associated database, GenBase. This system serves as the backbone for multiple business functions within Power Supply, including day-ahead and real-time power trading, bid optimization, gas procurement, pre-scheduling, and outage management.

Additionally, significant efforts were employed to integrate the information produced by the multiple, simultaneous, complex transactions performed by the above

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[39] Least cost-dispatch refers to a situation in which the most cost-effective mix of total resources is used, thereby minimizing the cost of delivering electric services. Once a contract has been deemed compliant with the utilities' procurement plan, the contract is not subject to a reasonableness review. However, the administration of the contract by the utility remains subject to reasonableness review and disallowance through ERRA proceedings.

[40] Additional References:D.02-10-062, at 52, as modified by D.02-12-074, D.03-06-067, D.03-06-076; D.05-01-054 (regarding scope of review and standard of review for contract administration in ERRA proceedings); D.02-12-074, at OP 24.b.

[41] *See* workpaper entitled "Reference to Least Cost Dispatch - D.02-12-074 Order" and "Reference to Least Cost Dispatch - D.02-10-062 Conclusion of Law."

mentioned systems with ERP. This successful initiative has allowed for the integration of energy financial settlements with the ERP financial system.

(6) Finance and Legal Solutions Group

The Finance and Legal Solutions group provides application support for all Operating Units including Financial & Operational Services, Legal, Audit Services, and Regulatory Affairs. This group provides support for systems to perform corporate accounting, tax filing, treasury cash management, and legal matters.

SCE's financial software has been configured to meet the financial and regulatory needs of SCE and accommodate cost flow requirements, regulatory and managerial accounting, accounts payable, and asset accounting. Functionality included are financial accounting and consolidations, managerial accounting, FERC accounting, fixed asset accounting including continuous property records, accounts payable/accounts receivable, non-energy billing, budgeting, treasury cash management, treasury and long term planning.

TDM also assists the Legal and Regulatory Affairs Operating Units by maintaining the Regulatory Case Management System, the Law Document Management/Records Management System, the Tariff Management System, and the Claims Management System. These application systems help the Legal Operating Unit and Regulatory Affairs manage litigation activities, regulatory proceedings, compliance activities, and other legal matters including the handling of customer claims and workers compensation claims. The functionality they provide supports the ongoing legal and regulatory work performed by the Legal and Regulatory Affairs Operating Units.

(7) Transmission and Distribution Solutions Group

The Transmission and Distribution Solutions group maintains the application systems used by the Transmission and Distribution Operating Unit (T&D) to safely and effectively construct, operate, and maintain the infrastructure that delivers electricity to SCE's customers. Examples of these application systems include the Energy Management System (EMS), Distribution Management System (DMS), the Outage Management System (OMS), Transmission and Distribution Asset Mapping System (T&D Asset Mapping), and Design Manager (DM).

The Energy Management System (EMS) monitors alarms to inform grid operators when a power line becomes overloaded or when a circuit breaker opens due to an abnormal condition. EMS allows the grid operator to remotely perform critical functions such as opening and closing circuit breakers to energize or de-energize a line, monitor load, and gather timely information related to system conditions and reliability. EMS also collects transmission and generation related data and transmits this data to the California Independent System Operator (CAISO) every four seconds. Access to this real-time status information allows the ISO and SCE to engage in the effective coordinated grid operations required to operate transmission and distribution infrastructure within safe physical limits.

The Distribution Management System (DMS) enables grid operators to monitor and remotely control specific equipment not included within the scope of EMS such as pole switches and capacitors located on the distribution system. Automating this equipment and providing operators with remote control capability greatly facilitates T&D's ability to reduce outage time for its customers.

The Outage Management System is used by the Grid Operations Division within T&D to monitor, respond to, and plan outages within SCE's distribution network. The system provides three key functions:

- Outage/incident management - key information in determining the "most probable outage location" by grouping outage calls.
- Circuit map viewing used to maintain near real-time electrical circuit connectivity.
- Switching plan creation and generation, used to prepare step-by-step procedures for performing planned maintenance of SCE's electrical distribution system.

The Transmission and Distribution Asset Mapping system is an essential geo-spatial analysis tool used within T&D for understanding problems in the field. It allows Troublemen and line crews to quickly isolate and solve an issue within a transmission and distribution network. In the event an outage requires resources and equipment above and beyond those available as part of the initial response, this information allows those first responders to quickly restore service to as many customers as possible.

(8) Customer Service Solutions

The Customer Service Operating Unit (CS) uses the systems and other technologies implemented and supported by the Customer Service Solutions group in TDM to deliver programs and services to SCE's 4.9 million customers. These programs and services include:

- Meter installations, testing, and repairs

- Turn on and turn off of electrical service
- Meter reading and data transfer to billing systems
- Bill calculation and preparation
- Managing credit and payment options
- Energy theft investigations
- Managing relationships with large manufacturers, government facilities, and agricultural and commercial enterprises
- Developing and implementing energy efficiency programs and services

There are a number of applications used by CS to deliver the above products and services. One of the most important is the Customer Services System (CSS). CSS provides over 100 functions supporting the Customer Care and Billing business processes. The system is essential in providing accurate and timely customer bills, tracking receivables, and creating and tracking field service orders (e.g., turning a customer's electric service "on" or "off"). CSS generates approximately 250,000 customer bills each business day. As such, even a one-day outage can have a significant impact on SCE's operations. CSS is also used to manage customer relationships, initiate new service requests, schedule and track service calls, and bill for products and services.

Another essential system used by Customer Service is the Account Management Information System (AMIS). This system is used by CS for the delivery of basic customer care to SCE's business customers. AMIS allows CS to manage contact information (e.g., for rotating outages and mass mailings), track customer projects (e.g., energy efficiency, new construction), view and report customer data (e.g., billing history), and provide current and archival information (e.g., energy efficiency and demand response program information).

The Real Time Energy Metering (RTEM) system supports the metering devices installed to support AB1x-29. AB1x-29 was passed in response to California's energy crisis and requires all service accounts whose demands exceed 200kW to have a Real Time Energy Meter installed. The RTEM system is the repository of real-time usage data acquired from these meters and acts as the "clearing house" for the business groups and application systems that use this data. This includes the customer billing system, the Energy Supply and Management department, and the Regulatory Operations department.

SCE.com is the primary website for SCE's customers to conduct business with SCE over the Internet. The website provides SCE customers with secure Internet access to information about their electric usage (including Edison SmartConnect® interval data), paperless-bills and electronic payment, planned outages, energy management solutions, and much more. This self-service functionality allows SCE's customer service representatives to focus on more complex, consultative interactions with our customers, and allows SCE to meet the anticipated increase in customer support needs associated with the introduction of new dynamic rates and load management programs, as well as new technologies (Home Energy Management/Home Area Networks, Plug-in Electric/Hybrid Vehicles) to help customers better manage their energy use.

(9) Technology Solutions and Support Group

The Technology Solutions and Support group in TDM provides production support and build/maintain lifecycle activities for enterprise applications, tools, and technologies. For example, this organization ensures systems and software reliability for the SAP solutions supporting critical business functions. The group also provides successful implementation of IT internal projects such as software and hardware upgrades, enterprise-wide large and complex technology efforts such as Microsoft Windows upgrade, IT cybersecurity, configuration management, and Data Center migration. This is accomplished by working with IT internal customers to deliver business solutions for the IT Operating Unit.

The support of all the SAP applications and the associated COTS applications are critical to the business operations of SCE. Currently the key core enterprise business functions provided by SAP are Financial Management, Supply Chain Management, Human Capital Management, Customer Relationship Management, Work Management, and Enterprise Asset Management. These core functions and the integrated SAP platform enable SCE to be prepared for needed growth and support for the replacement of the large electrical infrastructure to continue to provide a reliable electrical service to our customers. The Technology Solutions and Support group is comprised of the following organizations:

(a) SAP Operations Group

The SAP Operations group is accountable for day to day operability of the SAP solutions to ensure the reliability, integrity, security and performance of systems and software. This includes business critical SAP solutions such as Enterprise Core Components, Human Capital Management, Finance, Enterprise Asset Management, Enterprise Portal and Supplier

Portals, Process Integration (PI), as well as other technologies and tools that directly support core business functions and information needs for SCE.

Major responsibilities include:

- Provide planning, strategy, design and general consultation services related to upgrade/maintenance activities to the hardware, operating systems, database environments and appliances for the SAP application environment,
- Provide daily operational activities for monitoring, patch management, level 2/3 incident support, performance tuning, output management, job scheduling, and backup/recovery for all SAP solutions, and
- Support technical integration for SAP solutions that perform business analytics and enterprise-wide cross application integration via SAP PI or other third-party appliances.

(b) System Operations and User Administration Group

The System Operations and User Administration group manages accessibility and provides a secure environment for SCE internal users as well as external users and company data for day to day operability of the SAP solutions and maintaining the technical aspects of all SAP Governance Risk and Compliance application solutions.

Major responsibilities include:

- Perform security requirement analysis, design, and configuration activities in compliance with enterprise corporate security policies for the SAP applications and other integrated systems;
- Build and maintain application roles and position-based security models and authorizations across the entire SAP landscape;
- Maintain automated interfaces for user access and provisioning, and integration with Identity Management technical components;

- Maintain all technical aspects of all SAP Governance Risk and Compliance applications; and
- Support ongoing security based development and maintenance activities related to SAP and third-party appliances.

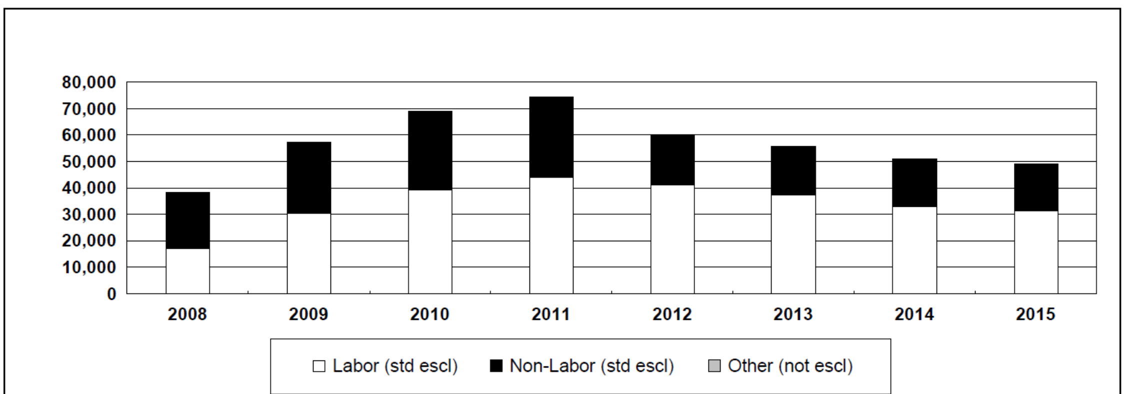
(c) Application Development Management Group

The Application Development Management group provides maintenance and development for enterprise applications, tools and technologies. The largest of these applications is SAP and the group is responsible for ensuring that the associated systems are reliable, stable, effective, and efficient.

2. Analysis of Operations & Maintenance Expense by FERC Accounts

a) FERC Account 920/921 – TDM

Figure II-7
Summary of Operations –Technology Delivery & Maintenance
Accounts 920/921 by Labor/Non-Labor/Other
Recorded 2008-2012 / Forecast 2013-2015
(Constant 2012 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	16,897	30,204	39,334	44,125	41,100	37,243	32,818	31,274
Non-Labor	21,418	27,180	29,575	30,264	18,960	18,566	18,094	17,669
Other	0	0	0	0	0	0	0	0
Total	**38,315**	**57,384**	**68,909**	**74,389**	**60,060**	**55,809**	**50,912**	**48,943**

← Forecast →

(1) Analysis of Recorded Costs

(a) Labor Expenses

From 2008 to 2009, TDM FERC Account 920 labor increased $13.307 million, or 79 percent. The primary driver of the 2009 increase was the implementation of Release 1 of the ERP system in 2008, which required staffing the Center for Continuous Improvement

(CCI) for SAP support beginning in 2009, which was required by SCE's license agreement with SAP. In addition, Release 1 ended the temporary system freeze for many systems, releasing a 2-year backlog of work which required a higher level of support. A smaller secondary cause was the beginning of Market Redesign Technology Update (MRTU) charges.

From 2009 to 2010, FERC Account 920 labor expenses increased $9.130 million, or 30 percent, due mainly to the implementation of Releases 2 and 3 of the ERP system, which required additional staffing for the CCI for SAP support as required by SCE's license agreement with SAP. Additionally Release 3 ended the temporary system freeze for all systems, releasing a 2-year backlog of work, which required a higher level of support. A smaller secondary cause was the first full year of MRTU charges.

From 2010 to 2011, FERC Account 920 labor expenses increased $4.791 million, or 12 percent, due mainly to the completion of staffing for the CCI organization to support the ERP system.

From 2011 to 2012, labor expenses experienced no significant change.

(b) Non-Labor Expenses

From 2008 to 2009, FERC Account 920 non-labor expenses increased $5.762 million, or 27 percent. The two primary drivers of the increase in 2009 were the beginning of Market Redesign Technology Update (MRTU) charges ($3.1 million) and the implementation of Release 1 of the ERP system, which required funding for the CCI (Center for Continuous Improvement) for SAP support, which was required by SCE's license agreement with SAP. In addition, Release 1 ended the temporary system freeze for many systems, releasing a 2-year backlog of work which required a higher level of support.

From 2009 to 2011, FERC Account 920 non-labor expenses experienced no significant change.

From 2011 to 2012, FERC Account 920 non-labor expenses decreased $11.304 million, or 37 percent The two primary drivers were (1) a completion of much of the backlogged work during the year, which freed up the resources required to support the backlog effort, and (2) SCE delaying some spending on operations and maintenance due to the late 2012 GRC decision.

3. Estimating Methodology and Test Year Forecast

In compliance with one of the CPUC Final Decision Directives for the 2015 GRC IT Testimony on Capitalized Software,[42] we reviewed our existing methodology for estimating GRC capitalized projects. One of the directives was to ensure SCE employs best industry practices in making its capitalized software project cost estimates, particularly as to in-house labor, project management and contingency. Additionally, since project managers at the time of the 2012 Final Decision were in the process of estimating 2015 GRC project estimates, we needed to develop a common estimation methodology for their immediate use.

A cross-functional IT team collaborated and agreed on the common areas that made up the components of the estimation model, and ultimately a single methodology and workpaper was used as the benchmark. Some of these components included:

- Classification of projects into various COTS and Development project types,
- Labor rates used,
- Contingency levels,
- Various cost components such as capitalization of ongoing licensing fees,
- Labor expenses, and
- Vendor allocations.

This estimation model and methodology helped provide further consistency in establishing high level capital project estimates across all areas in IT.[43]

Table II-7
Technology Delivery & Maintenance
Comparison Table for FERC Account 920/921
Recorded/Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 41,100	$ 31,274	$ (9,826)	OpX Savings
Non-Labor	$ 18,960	$ 17,669	$ (1,291)	OpX Savings
Total	$ 60,060	$ 48,943	$ (11,117)	

[42] D.12-11-051, pp. 435-436, also Ordering Paragraph 27.

[43] *See* workpaper entitled "2015 GRC IT Capital Estimates TEMPLATE v1.1.doc," and "GRC Estimation Worksheet TEMPLATE v1.1.xls."

a) Labor Expenses

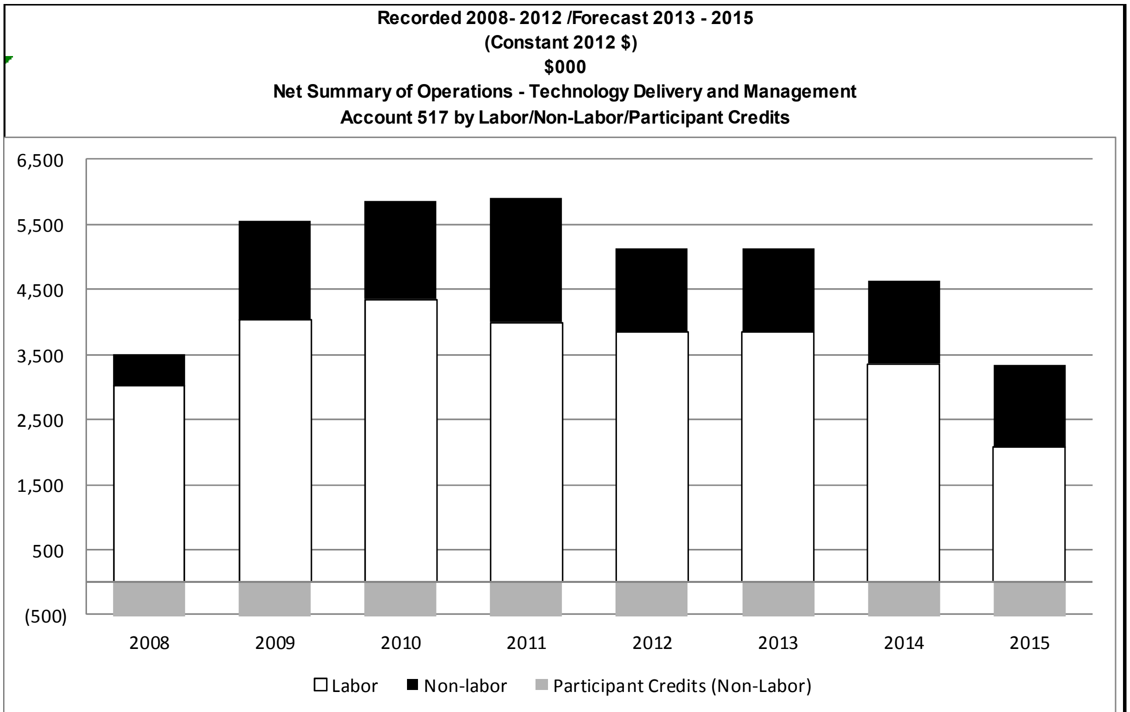
For 2015, we forecast labor expenses of $31.274 million, a $9.826 million reduction from 2012. Even though recorded data indicates an averaging methodology would be an acceptable basis for a forecast of labor expenses, we have chosen the last recorded year as it best represents the most accurate 2012 labor expenses and the most transparent basis for the in 2015 request. This reduction from our 2012 recorded as a result of OpX savings partially offset by an additional request for $1.7 million in severance as described in Chapter 1, section B of this testimony.

b) Non-Labor Expenses

For 2015, we forecast non-labor expenses of $18.141 million, a $0.918 million reduction from 2012. As with the labor expenses for this account, although recorded data indicates an averaging methodology would an acceptable forecast methodology of non-labor expenses, we have chosen the last recorded year. The differences in using either methodology are relatively minor and are mitigated by the fact that we are requesting a decrease in funding for this account from 2012 recorded spending levels. For test year 2015, we reduced our expenses from our 2012 base to reflect SCE's OpX savings efforts.

c) FERC Account 517 – TDM

Figure II-8
Summary of Operations –TDM Support for Nuclear
Account 517 by Labor/Non-labor/Other
Recorded 2008-2012 /Forecast 2013-2015
(Constant 2012 $000)



	Adjusted/Recorded					Forecasted		
	2008	2009	2010	2011	2012	2013	2014	2015
Labor	3,009	4,022	4,344	3,992	3,844	3,844	3,350	2,067
Non-labor	500	1,535	1,524	1,915	1,281	1,281	1,281	1,281
Participant Credits (Non-Labor)	(720)	(1,198)	(1,269)	(1,268)	(1,117)	(1,117)	(1,009)	(730)
Total	2,789	4,359	4,599	4,639	4,008	4,008	3,622	2,618

(1) Analysis of Recorded Costs

(a) Labor Expenses

From 2008 to 2009, FERC Account 517 increased $1.013 million, or 34 percent. In 2008 there had been a decrease in labor expenses relative to 2007 due to SCE employees being transferred to the SAP Enterprise Resource Planning (ERP) project and a temporary freeze on system changes pending completion of phases of the ERP project. The primary driver of the increase in 2009 was the implementation of Release 1 of the ERP system, which ended the temporary system freeze for most applications in the San Onofre (FERC 517) portfolio of applications and brought a return to a normal level of support employees.

From 2009 to 2011, FERC Account 517 labor expenses remained relatively flat due to a lack of significant change to the San Onofre portfolio of applications. While the ERP project freeze was no longer an issue, the San Onofre Steam Generator Replacement project established a similar freeze process. This allowed windows of a few months duration when software maintenance could be implemented, but there was little demand or capacity for significant system changes because the San Onofre organization was appropriately focused on executing the Steam Generator Replacement outages successfully. In addition, a significant portion of the portfolio – asset management, work management, and supply chain functions – had moved to the enterprise solution (SAP). So maintenance and operation activities of existing systems continued at a steady pace, but the portfolio did not grow significantly during this period.

From 2011 to 2012, FERC Account 517 labor expenses remained relatively flat due to a lack of significant change to the San Onofre portfolio of applications. There was little demand or capacity for significant system changes because the San Onofre organization was appropriately focused on addressing the steam generator issues. Therefore, maintenance and operation activities of existing software systems continued at a steady pace, but the portfolio did not grow significantly during this period.

(b) Non-Labor Expenses

All non-labor expenses for SONGS include participant credits. SONGS participant credits are expense offsets received from the minority owners of SONGS that represent their proportionate share of O&M expense billed by SCE.[44] The numbers below represent the net of non-labor expenses and participant credits.

From 2008 to 2009, FERC Account 517 included an increase in non-labor expenses of $0.557 million. In 2008 there was a decrease in non-labor expenses due to a temporary freeze on system changes for the ERP project. The primary driver of the increase in 2009

[44] SCE is the operating agent and majority owner of the San Onofre Nuclear Generating Station (SONGS). SCE owns 78.21 percent of SONGS with San Diego Gas & Electric (SDG&E) and the City of Riverside sharing in the remaining 21.79 percent. Since SCE is the majority owner and operating agent for SONGS, SCE bills the minority participants for their share of costs to operate these facilities. The amounts billed to the participants are recorded as credits (i.e., contra expenses).

was the implementation of Release 1 of the ERP system, which ended the temporary system freeze, releasing a 2-year backlog of work which required a higher level of support.

From 2009 to 2010, FERC Account 517 non-labor expenses decreased by 25 percent (or $82,000) due to larger participant credits associated with the labor for continued efforts on the backlog of maintenance activity.

From 2010 to 2011, FERC Account 517 non-labor expenses included an increase of $392,000, due to continued efforts on the backlog of maintenance activity following ERP Release 2.

From 2011 to 2012, FERC Account 517 non-labor expenses decreased $483,000 or 75 percent. This was primarily due to a reduction in software maintenance during the system freeze associated with the extended SONGS plant outages, as well as a conservative approach to spending on operations and maintenance due to the late GRC decision.

(2) Estimating Methodology and Forecast

Table II-8
Technology Delivery & Maintenance
Comparison Table for FERC Account 517
Recorded/Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 3,844	$ 2,067	$ (1,777)	SONGS Closure
Non-Labor	$ 164	$ 551	$ 387	Decreased Participant Credits
Total	$ 4,008	$ 2,618	$ (1,390)	

(a) Labor

For 2015 we forecast labor expenses of $2.067 million, a $1.777 million reduction from 2012. This reduction is due primarily to the adjustments made in our labor expenses based on SCE's decision announced on June 7, 2013 to retire SONGS Units 2 and 3.[45] Detailed calculation of these adjustments is contained in our workpaper.[46] Even though recorded data indicates the averaging methodology would be an acceptable basis for a forecast of labor expenses, we have chosen the last recorded year as it best represents the most accurate 2012 labor expenses and the

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45 *See* workpaper entitled, "Edison Press Release June 7, 2013."

46 *See* workpaper entitled, "TDM SONGS 517 Savings."

most transparent basis for the 2015 request. Note that a four year recorded average is essentially the same as last recorded year.

(b) Non-Labor Expense

For 2015 we forecast non-labor expenses of $0.551 million, an increase of $0.387 million from 2012. As with the labor expenses for this account, even though recorded data indicates an averaging methodology would be an acceptable basis for a forecast of non-labor expenses, we have chosen the last recorded year as it best represents the most accurate 2012 non-labor expenses and the most transparent basis for the 2015 request. The increase is due to a decrease in our participant credit which is netted with the non-labor expense. The total O&M request (labor plus non-labor net of participant credits) is substantially lower for 2015.

D. Cybersecurity & IT Compliance

1. Cybersecurity & IT Compliance Division (C&C)

a) Description of Activities

SCE's electric infrastructure assets are part of the nation's Critical Infrastructure as defined by the U.S. Department of Homeland Security. A high level of vigilance is required to maintain cybersecurity for this infrastructure, especially in the light of the continually evolving industry, regulatory, technology and threat landscapes.

According to Forbes.com,[47] some of the leading cyber threats businesses may face in 2013 include social engineering attacks, botnets, insider threats, and malware. The Chertoff Group[48] cites similar threats to the electric industry, as well as others such as advanced persistent threats and coordinated physical/cyber-attacks.

The Cybersecurity & IT Compliance Division (C&C) oversees an enterprise Cybersecurity Program to maintain the confidentiality, availability, integrity, and accountability of information technology systems and operations through security engineering and risk management. The rapid evolution of technologies, mounting regulations, increased cyber threats, and the rising automation

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47 *See* workpaper entitled "The Biggest Cybersecurity Threats of 2013," by Tomer Teller, available at http://www.forbes.com/sites/ciocentral/2012/12/05/the-biggest-cybersecurity-threats-of-2013-2/, December 5, 2012 (Last visited April 22, 2013).

48 *See* workpaper entitled "US Electric Industries: Top Threat Scenarios & Mitigation Actions Final Report," The Chertoff Group and Edison Electric Institute, December 15, 2011.

of the electric grid require the strengthening of key C&C functions. To accomplish this mission, C&C is organized into two major functional areas: the Cybersecurity function, and the IT Compliance function.

(1) Cybersecurity Function

Addressing cybersecurity is critical to enhancing the security and reliability of the nation's electric grid. Ensuring a resilient electric grid is particularly important since it is the most complex and critical infrastructure that other sectors (e.g., transportation, communications) depend upon to deliver essential services. A report by the Edison Electric Institute on Principles for Cybersecurity and Critical Infrastructure Protection states:

> Protecting the nation's electric grid and ensuring a reliable supply of power are the electric power industry's top priorities. Cybersecurity incidents may disrupt the flow of power or reduce the reliability of the electric system. Key to the success of this effort is the ability to provide measures capable of protecting the evolving intelligent network against interruption, exploitation, compromise or outright attack of cyber assets, whether the attack vector is physical, cyber, or both.[49]

C&C's Cybersecurity engineers are highly technical specialists that are trained to provide protection from cyber threats, such as malicious intrusion by hackers or insiders and the proliferation of various forms of infections such as viruses, worms, spy-ware, and ad-ware, which can affect the ability to provide reliable generation and delivery of electric power. Cybersecurity engineers conduct cyber threat analysis, monitor and mitigate threats to SCE's information assets, keep abreast of changes in security technologies, perform forensic and e-discovery services, and provide expert advice to projects on security matters. Additionally, the Cybersecurity Engineering group provides data loss prevention solutions to detect and prevent unauthorized attempts to copy or send sensitive data outside SCE, intentionally or unintentionally.

The SCE facilities that operate high-risk systems require dedicated monitoring.[50] Therefore, on-site deployment of resources at these facilities is needed for situational awareness and to deal with threats in real-time. Organizations with systems in this high-risk category include the Nuclear Operating Unit, Power Supply's Power Production and Power Procurement

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[49] *See* workpaper entitled "Edison Electric Institute on Principles for Cybersecurity and Critical Infrastructure Protection," Edison Electric Institute, September 9, 2010.

[50] *See* workpaper entitled "Putting SCADA Protection on the Radar," by Marc Solomon, available at http://www.securityweek.com/putting-scada-protection-radar, May 17, 2012 (Last visited April 22, 2013).

Divisions, IT's Power Systems Controls Division, Transmission & Distribution's Grid Operations Division, and Customer Service. An article from Security Week states:

> Recent high profile compromises point to an urgent need to secure process control networks. Stuxnet, a purpose–built worm for attacking industrial control systems led the way in showing just what can be done by a professional team. More recently, Duqu entered the threat landscape enabling attackers to steal data from manufacturers of industrial control systems and use that data to exploit entities using these systems…SCADA networks are the most unprotected networks of all and now cyber-criminals have them in their sights. If they get access, the consequences for many organizations, their customers and perhaps the population at large, could be extremely damaging.[51]

Additionally, in February 2013, an east coast utility suffered a denial of service attack which affected the utility's website, company email and automated phone system.[52]

To address these risks, the Cybersecurity Engineering group will deploy ("out-post") specialized teams to these high risk areas to conduct cyber-threat analysis, monitoring, and mitigation of threats to SCE's information/SCADA assets. Integrating Cybersecurity engineers closely with their assigned business groups will allow the cyber specialists to build relationships and better understand business issues and activities in order to understand potential threats in their particular business environment. It will also allow them to provide immediate awareness and rapid response in the event of cyber incidents. In addition, they will assist in conducting forensics and e-discovery services, and provide expert advice to projects on security matters.

An effective Cybersecurity Program requires the balanced implementation of security policies, standards, processes, and a comprehensive awareness program. The IT Risk Management & Policies group within C&C develops policies and standards to ensure the confidentiality, integrity and availability of SCE's information assets. This group supports projects to implement the cybersecurity requirements of applicable laws and regulations such as Sarbanes-Oxley (SOX), Health Insurance Portability Accountability Act (HIPAA), and Payment Card Industry (PCI) Data Security Standards. This group also provides governance to ensure compliance with SCE's cybersecurity

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[51] *Id.*

[52] *See* workpaper entitled "JEA victim of cyber attack," available at http://www.news4jax.com/news/JEA-victim-of-cyber-attack/-/475880/18982700/-/o2d12t/-/index.html, February 19, 2013 (Last visited April 22, 2013).

standards and provides technical leadership to projects through a focus on security, availability and reliability.

Informed employees are the first line of defense against the growing cyber-attack vectors. As such, IT Risk Management & Policies group maintains a very comprehensive role-based cybersecurity awareness and training program which is disseminated via instructor-led sessions, web-based training, written and visual media, and informational brown bag sessions. In addition, a robust cybersecurity portal is available to all SCE employees and contractors with information on the latest cybersecurity threats and appropriate preventive measures.

Another group within C&C is Industry Engagement and Outreach, which administers the program between SCE and Federal Agencies through a Cooperative Research and Development Agreement (CRADA). This agreement allows SCE and the Department of Homeland Security (DHS) to engage in data flow and analytical collaboration activities associated with cybersecurity, including detection, prevention and mitigation. This agreement requires SCE to maintain appropriate facility security capabilities and personnel eligible for the appropriate level of clearance. The Industry Engagement and Outreach group also coordinates, monitors, and centrally tracks involvement and happenings in various cyber-focused private and public partnerships for the purpose of real-time information sharing, building trusted relationships, and sharing best practices.[53]

In addition to the collaboration between private/public partnerships, the focus on cybersecurity for critical infrastructure is on the rise from the White House, Congress, state governments, and regulatory bodies. In September 2012, Sen. Jay Rockefeller sent letters to the CEOs of Fortune's Top 500 companies, including SCE, asking them to outline the measures their companies have taken to protect their computer systems from cyber-attack.[54] In January 2013, Reps. Henry Waxman and Edward Markey issued letters to various organizations within the electric industry requesting information regarding each entity's efforts to ensure its electric grid assets are protected from

[53] Private and public entities include Department of Homeland Security (DHS), National Cybersecurity and Communications Integration Center (NCCIC), NERC Electricity Sector/Information Sharing and Analysis Center (ES-ISAC), Utility Information Technology Benchmark (UNITE), Edison Electric Institute (EEI), Nuclear Energy Institute (NEI), Electric Power Research Institute (EPRI), Utilities Telecom Council (UTC) and many others.

[54] *See* workpaper entitled "Rockefeller asks Fortune 500 CEOs to weigh in on cybersecurity debate," by Jennifer Martinez, available at http://thehill.com/blogs/hillicon-valley/technology/250335-rockefeller-asks-ceos-of-500-top-us-companies-for-views-on-cybersecurity, September 19, 2012 (Last visited April 22, 2013).

a cyber or physical attack or geomagnetic storm.[55] In February 2013, the President issued an Executive Order to address three areas that are necessary to improve security for the nation's Cyber Critical Infrastructure: (1) information sharing; (2) a flexible risk-based framework of core practices based on existing standards; and (3) privacy protections.[56]

C&C's External Requirements and Analysis (ERA) group is responsible for responding to these requests for information. This group also performs a Legislative and Regulatory watch function by which they monitor and track congressional and legislative activities for emerging legislation relating to cybersecurity, critical infrastructure protection (CIP) and data privacy at the federal and state levels. The ERA group communicates changes and impacts due to these new requests, regulations and laws to management and stakeholders.

ERA facilitates development and documentation of compliance program processes and security controls within IT to support new and emerging legislation or regulations relating to cybersecurity, data privacy, and critical infrastructure protection, and then ensures regulatory/legislative requirements are built into projects during the planning and design phases. This group also guides cybersecurity strategies and risk assessments to meet legislative/regulatory requirements. ERA's active monitoring of new and emerging regulations and legislation allows timely adjustment and preparation of compliance-related business operations and processes which reduces exposure to security and compliance risks.

(2) IT Compliance Function

C&C's IT Compliance group oversees and manages regulatory compliance activities across IT and develops programs to help ensure compliance with federal and state legislative and regulatory mandates regarding cybersecurity. The IT Compliance group is comprised of three teams: (1) NERC Compliance (2) Compliance Monitoring, and (3) Regulatory & Corporate Compliance.

The NERC Compliance group facilitates audits conducted by the Western Electricity Coordinating Council (WECC) to assess compliance with NERC reliability standards within the IT operating unit. The NERC Compliance group also assesses regulatory notices and emerging

[55] *See* workpaper entitled "Letter to SCE from Representatives Markey and Waxman," January 17, 2013.

[56] *See* workpaper entitled "Improving the Security of the Nation's Critical Infrastructure," by Michael Daniel, available at http://www.whitehouse.gov/blog/2013/02/13/improving-security-nation-s-critical-infrastructure?utm_source=related, February 13, 2013 (Last visited April 22, 2013).

standards for controls implications and impacts. In 2012 SCE completed the first NERC CIP regulatory audit of the Energy Management System and related controls. The year-long effort required over 10,000 hours by IT to plan, prepare, and respond to the regulatory audit. A team of auditors from the WECC reviewed existing controls, processes, and procedures, and assessed SCE's compliance with the NERC CIP regulations.

The Compliance Monitoring group performs reviews and assessments of functional areas and controls for compliance to regulatory mandates, standards, and requirements and reviews selected programs and projects for risks and regulatory compliance.

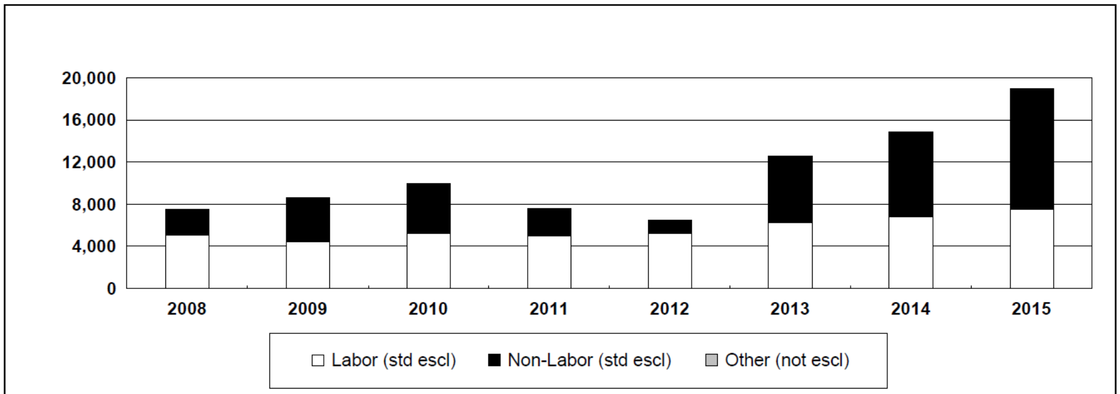
The Regulatory & Corporate Compliance group oversees regulatory compliance activities across IT and SCE regulatory compliance teams. In addition, this group tracks and reports the status of audit and vulnerability assessment observations across IT. This group also coordinates internal and external audits for IT, tracks data requests, and facilitates remediation plans for audit observations and vulnerability assessments.

SCE's Cybersecurity Program is undergoing an unprecedented transformation to address smart energy initiatives, the increasing convergence of consumer and enterprise technologies, and the rise of a complex array of cyber threats. Examples of the complex technical landscape include the erosion of the network perimeter through the mass adoption of remote access and wireless technologies, and implementation of smart meters.

2. Analysis of Operations & Maintenance Expense by FERC Accounts

a) FERC Account 920/921 – C&C

Figure II-9
Summary of Operations –Cybersecurity & IT Compliance
Accounts 920/921 by Labor/Non-Labor/Other
Recorded 2008-2012 / Forecast 2013-2015
(Constant 2012 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	5,083	4,456	5,168	4,977	5,254	6,251	6,801	7,529
Non-Labor	2,377	4,196	4,792	2,577	1,224	6,357	8,078	11,494
Other	0	0	0	0	0	0	0	0
Total	**7,460**	**8,652**	**9,960**	**7,554**	**6,478**	**12,608**	**14,879**	**19,023**

← Forecast →

(1) FERC Account 920/921 (C&C)

(a) Analysis of Recorded Costs

(i) Labor Expenses

From 2008 to 2009, C&C labor expenses decreased by 12 percent (or $0.627 million) due primarily to a reorganization C&C's IT Compliance group that resulted in a change in the group composition to fewer employees and more contingent workers.

From 2009 to 2010, C&C labor expenses increased 16 percent (or $0.712 million) due to increased support for NERC CIP and SOX audits, and an increase in staff of 1 manager and 2 engineering staff for the Cybersecurity Program. The years 2011 and 2012 remained relatively flat.

(ii) Non-Labor Expenses

From 2008 to 2009, C&C non-labor expense increased 77 percent (or $1.8 million) due to the deployment and ongoing support of published NERC CIP Cyber

Security Standards, the continued strengthening of cybersecurity, internal controls and data protection capabilities, adherence to regulatory requirements, and engineering and technology governance.[57]

From 2009 to 2010, C&C non-labor increased 14 percent (or $0.605 million) due to increased consulting and contract labor for NERC CIP support, vulnerability assessments, and cybersecurity strategy projects, as well as increased software licensing and maintenance costs.

From 2010 to 2011, C&C non-labor decreased 46 percent (or $2.2 million) due to the decrease of consulting and contract labor for NERC CIP support and vulnerability assessments, decreases in contract labor support of expense projects, as well as transfers of several contract resources out of C&C into the Enterprise Information Management & Architecture group.

From 2011 to 2012, C&C non-labor decreased 52 percent (or $1.3 million) due to reductions of contract labor, and reduced spend on NERC CIP support, vulnerability assessments, security audits, staff training and participation in industry forums.

(b) Estimating Methodology And Test Year Forecast

The following trends and drivers will have a significant impact on the future demands of the Cybersecurity program:

- Advanced Persistent Threat
- Social engineering targeting end-users
- Mobile phone attacks
- Insider threats
- Identity theft
- Increasingly sophisticated website attacks
- Smart Grid expansion
- Mobile and wireless enablement
- Social media use
- Cloud computing use
- Compliance with evolving regulations

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[57] *See* Chapter II, Section D.1 of this testimony, describing the Cybersecurity Function, engineering and technology governance ensures compliance with SCE's cybersecurity standards.

- Customer demands for privacy

Incremental expenses in both labor and non-labor for C&C are warranted due to:

- Ever-increasing cybersecurity threats faced by SCE
- Increasing level of regulatory-compliance requirements
- The growing need to strengthen internal controls to allow collaboration with business partners and external entities
- Higher than expected salaries and consultation fees in the market for scarce resources in cybersecurity and SCADA security fields
- Increasing cybersecurity software acquisition and maintenance costs in the market-place

Table II-9
Cybersecurity & Compliance
Comparison Table for FERC Account 920/921
Recorded / Adjusted 2012 to 2015

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 5,254	$ 7,529	$ 2,275	Cyber Engineering workforce additions; Expansion of risk management programs; Administrative support for CRADA; Communications and training for cyber related projects
Non-Labor	$ 1,224	$ 11,494	$ 10,270	Cyber Engineering workforce additions; Contracts for penetration testing and vulnerability assessments;Contracts for tools for real time controls and monitoring; Increased cost of software licensing and maintenance
Total	$ 6,478	$ 19,023	$ 12,545	

(i) Labor Expenses

For Test Year 2015, we estimate labor expenses of $7.529 million, a $2.275 million increase over 2012. Our forecast was developed using the 2012 amount as the base with future year adjustments as defined below. Although historical recorded data indicates an averaging method would be an acceptable basis for a forecast, we have chosen the last recorded year as the base as we believe that it represents the most accurate basis from which to forecast 2015. To that base, we have added incremental requirements as discussed below. Note that even using a five-year average, the difference would not be substantial (approximately 5 percent).

Drivers for the forecast labor increases are additions to the Cybersecurity Engineering workforce, resources for enterprise expansion of our risk management program and updates to risk management policies, additional resources to perform communications and training in support of cybersecurity projects, and administrative support for the Cooperative Research and Development Agreement (CRADA) between SCE and DHS. These costs are necessitated by: (1) increased sophistication and volume of external cyber threats, (2) the need to strengthen, modernize and extend controls throughout the enterprise, (3) the need for unified monitoring capabilities, and (4) creation of the partnership with DHS to improve detection, prevention and mitigation of cyber threats.[58]

(ii) Non-Labor Expenses

For test year 2015, we estimate non-labor expenses of $11.494 million, a $10.270 million increase over 2012. Our forecast was developed using the 2012 adjusted amount as the base with future year adjustments as defined below. Although historical recorded data indicates an averaging method would be an acceptable basis for a forecast (and would result in a substantially higher base year estimate than using the last year recorded), we have chosen the last recorded year as the base as we believe that it represents the most accurate basis from which to forecast 2015. To that base, we have added incremental requirements as discussed below.

Drivers for the forecast increases are the addition of contract workers[59] to the Cybersecurity Engineering workforce to allow deployment of resources to high-risk areas; contracts with specialized vendors to perform penetration tests and vulnerability assessments; contracts with cybersecurity tool vendors to introduce real-time controls and monitoring; contractor support for the update of the risk management program; and increased costs of software licensing and maintenance. These costs are necessitated by the increased sophistication and volume of external cyber threats; the need to strengthen, modernize and extend controls throughout the enterprise; and the requirement for unified monitoring capabilities.[60]

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[58] *See* workpaper entitled "C&C O&M Labor and Non-Labor Additions."

[59] The costs for contract labor are accounted for as a non-labor expense.

[60] *See* workpaper entitled "C&C O&M Labor and Non-Labor Additions."

E. Enterprise Information Management & Architecture

1. Enterprise Information Management & Architecture Division (EIM&A)

a) Description of Activities

Enterprise Information Management & Architecture (EIM&A) is a group within SCE's IT Operating Unit responsible for maximizing the value of technology investments through the development and utilization of information and data management services, strategic architectures, and application and technology roadmaps. EIM&A's major responsibilities include:

- Developing, maintaining, and governing SCE's Enterprise Architecture, which is used as the blueprint for aligning our short and long term technology investments to the needs of the business;
- Managing SCE's data assets to provide accurate and reliable information, enabling informed and timely business decisions; and
- Providing enterprise technology services that support the delivery of cost-effective IT solutions through well-defined and properly governed technology standards.

EIM&A's major functions are:

- Enterprise Architecture: Designing, implementing, and optimizing actionable architectures and enterprise technology services;
- Enterprise Information Management: Managing the enterprise's data assets to provide accurate and reliable information, enabling informed and timely business decisions;
- Technology Innovation: Assessing and introducing emerging and new-to-organization technologies; and
- Technology Standards Management: Improving technology utilization through well-defined and properly governed technology standards.

(1) Enterprise Architecture

The Enterprise Architecture (EA) function is responsible for the planning for IT investments across the enterprise based on strategic business priorities and critical business capabilities. This function works with the Operating Units in planning a multi-year roadmap of technology investments with a targeted enterprise architecture that delivers on strategic business objectives, reduces future technology investments by reusing common solutions, increases the speed of enabling business capabilities, and lowers ongoing costs by simplifying the complexity of the portfolio by decommissioning redundant solutions.

Various inputs are needed for these planning functions, which include business drivers and capabilities identified by Operating Units, technology refresh requirements, risk and compliance requirements, legal requirements, and regulatory mandates. EA will align proposed initiatives, applications, and technologies to these business drivers and capabilities allowing for identification of redundant solutions and potential cost reductions. In addition, by increasing visibility to planned investments across the enterprise, IT will enhance its accuracy of forecast spend. These planning efforts greatly benefit groups engaged in key investment governance processes such as the Capital Prioritization and Portfolio Management Teams, and other enterprise technology services. With proper planning of the IT pipeline of investments, focus can be given to reducing IT capital spend levels and ensuring allocation of IT capital across the enterprise based on strategic priorities.

The benefits associated with Enterprise Architecture include:

- Improving demand management by eliminating requests that are not aligned to strategic objectives and priorities and concentrating on high value projects;
- Optimizing application and technology portfolios by identifying assets to decommission over time;
- Reducing development costs and lowering application operating costs by leveraging existing solutions that can be used across Operating Units with common business capabilities, and by utilizing reference architectures to avoid creation of redundant solutions that provide similar functionality;
- Identifying and implementing Commercial Off The Shelf (COTS) solutions rather than costlier custom development;
- Increasing the speed of delivery of business solutions by increasing alignment between IT and other SCE Operating Units, and standardizing IT environments and tools; and
- Enhancing cost forecasting of the IT pipeline of investments.

(2) Enterprise Information Management

The Enterprise Information Management (EIM) function is responsible for designing, implementing, and maintaining data services to ensure SCE customers and employees can get the information they need in a timely and cost-effective manner. EIM services help to ensure data quality and integrity, appropriate accessibility, and compliance with regulatory and legislative requirements. EIM develops and supports the systems and tools for:

a) Utilizing information, such as business intelligence (includes analytics and reporting), content management (includes internal and external portal/web capabilities), and enterprise mobility (includes tablets and smart phones); and

b) Managing enterprise data, such as business application database administration (transactional and analytic), development of data and information architectures, application & process integration, and data movement.

The benefits associated with Enterprise Information Management services include:

- Simplifying processes by eliminating redundancy, delivering standardization, promoting reusability, resolving semantic issues, and providing accurate information that enables performance improvement;
- Reducing development and maintenance cost by developing and implementing common enterprise information services rather than redundant application specific interfaces;
- Extending the life and usability of legacy applications by utilizing them as a source for information services;
- Minimizing infoglut by organizing unstructured contents (such as e-mail systems, document management applications, records management system, etc.);
- Managing governance, risk and compliance by providing transparency to key information that meets compliance requirements;
- Improving workforce effectiveness by providing information to manage and optimize sourcing strategy;

- Increasing enterprise agility, by providing consistent data structures, definitions, and standards;
- Optimizing revenue, by providing timely, accurate, and consistent information to support procurement processes; and
- Improving customer satisfaction and employee decision making process based on improvements in information quality (e.g. outage status information) and provision of real time information and single, consistent views of information across all points of interaction.

(3) Technology Innovation

The Technology Innovation function is responsible for the assessment and introduction of emerging and new-to-organization technologies. Technology continues to evolve at a fast pace, and this function evaluates how the latest products can improve business operations and provide value to SCE.

An example of technology innovation is the Smart Grid System Engineering (SGSE) initiative, which is responsible for research, development, and demonstration of advanced technologies necessary to integrate new energy, communications, security, and automated technologies required to meet state and federal sustainable energy policy objectives such as renewable generation, zero net energy homes, distributed energy resource, and plug-in electric vehicle goals. The SGSE group is primarily focused on engineering solutions using a combination of information technologies and operational technologies to enable new capabilities and control schemes that improve grid reliability and integrate variable renewable resources and new energy technologies into the power system. Shifting today's electric grid to a smarter electric grid – one that increasingly relies on technology to maintain stability and achieve a higher level of resilience – requires a deep understanding of systems and control theory, computer science, power systems, and utility operations. SGSE applies these diverse and specialized disciplines in a coordinated approach that yields cost efficient, manageable, and reliable solutions through the development of clear Smart Grid strategies and architecture approaches. The goal of the SGSE group is to ensure that the introduction of automation, connectivity, and advanced control systems creates a system that is manageable, secure, affordable, and resilient.

SGSE supports the Advanced Technologies team in the Transmission and Distribution Operating Unit (T&D) by providing Smart Grid Systems Engineering services in the form of architecture development, network-centric and "system of systems" designs, Smart Grid cyber-security engineering, general and embedded systems design in the bulk transmission system, substation, distribution network and beyond the meter applications, and standards development. The SGSE group supports EIM&A's mission by assembling cross-disciplinary teams from divisions across IT to research, develop, and implement Smart Grid projects that introduce new technologies into SCE's grid operations environments. The SGSE group, in conjunction with Advanced Technologies, operates a Smart Grid Systems Lab to test and assess the maturity and readiness for deployment of technologies in SCE's grid modernization efforts.

(4) Technology Standards Management

The Technology Standards Management function is responsible for the establishment, enforcement, and communication of IT technology standards. The purpose of IT technology standards is to support the EIM and EA functions by improving the integration needs across the enterprise, reducing system and technology redundancies, increasing the speed of delivery of business solutions, and optimizing IT support costs.

The benefits associated with Technology Standards Management include:

- Improving the integration needs across the enterprise;
- Reducing system and technology redundancies, which in turn reduces total cost of ownership;
- Increasing the speed of delivery of business solutions by promoting consistent use of standard tools;
- Minimizing business risks of nonstandard solutions, which in turn minimize licensing and support costs; and
- Providing a framework for multiyear technology investment decisions.

b) Optimization of Experience

EIM&A's team of experienced architects is supporting SCE to effectively reduce costs of software development, implementation and maintenance by:

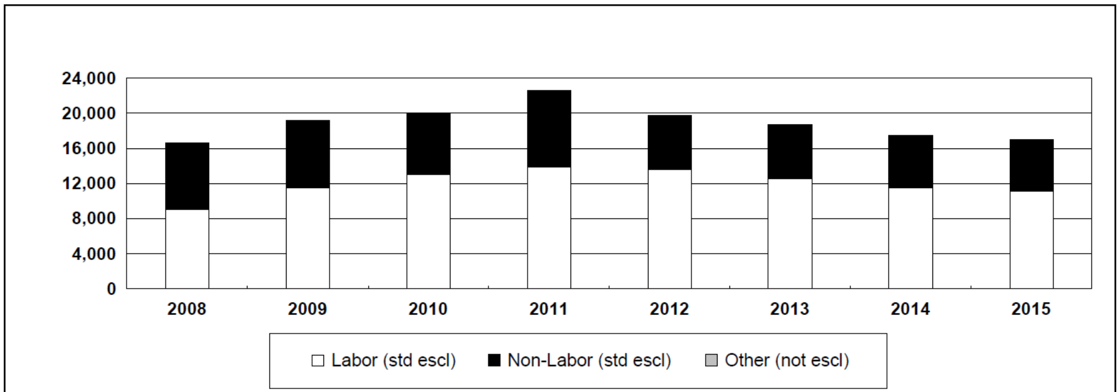
- Developing and implementing enterprise-wide data services rather than redundant application specific interfaces. Once developed, data services are reused by new applications rather than SCE having to develop additional interfaces for those applications. The use of enterprise-wide data services also reduces maintenance costs as any changes in data only need to be made in one place rather than in a multitude of interfaces.

- Extending the life and usability of legacy applications by utilizing them as a source for data services. The data service would use the logic or business rules (e.g. bill calculation) embedded in the legacy application or retrieve information from the legacy application database. This can forestall the replacement of the legacy application while ensuring a consistent application of the functionality (e.g. billing) provided by the data service. New applications that utilize the data service would not directly interact or interface with the legacy application. When the legacy application is eventually replaced, the applications that utilize the data service are not affected and do not require changes. The source for the data service has changed, but the interface to it that is used by applications remains the same.
- Identifying and implementing Commercial Off The Shelf (COTS) products where appropriate, rather than other costlier custom development activities to meet growing demand for technology solutions. A COTS implementation that meets the required business capabilities will typically cost less than a custom development. Maintenance costs are also reduced as the maintenance is provided by the COTS vendor, which is usually less costly than if SCE attempts to support COTS internally.
- Leveraging existing solutions that can be used across Operating Units with common business capabilities.
- Utilizing reference architectures to speed delivery time of new applications and reduce development costs. Reference architectures are documented best practices for technology solutions. They reduce the time for application design and ensure the use of appropriate underlying technologies as specified by the Technology Standards Management function.

2. Analysis of O&M Expense for Enterprise Information Management and Architecture:

a) FERC Account 920/921 – EIM&A

Figure II-10
Summary of Operations –Enterprise Information Management & Architecture
Accounts 920/921 by Labor/Non-Labor/Other
Recorded 2008-2012 / Forecast 2013-2015
(Constant 2012 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	9,028	11,500	12,984	13,895	13,517	12,553	11,447	11,060
Non-Labor	7,627	7,672	7,043	8,720	6,209	6,111	5,993	5,886
Other	0	0	0	0	0	0	0	0
Total	**16,655**	**19,172**	**20,027**	**22,615**	**19,726**	**18,664**	**17,440**	**16,946**

← Forecast →

(1) Analysis of Recorded Costs

(a) Labor Expenses

From 2008 to 2009, labor expenses increased by $2.5 million (or 27 percent), primarily due to the transition of SCE employees from the ERP development project to the EIM&A organization after the implementation of Releases 1 and 2. These employees provided on-going support for the increase in demand for Business Intelligence work, which included Analytics and Reporting, and Business Objects[61] services and support.

From 2009 to 2010, labor expenses increased by $1.5 million (or 13 percent), due to: (a) the transition of SCE employees from the ERP development project to the EIM&A organization after the implementation of Release 3 to support the additional demand for

[61] Business Objects is the SAP business intelligence tool.

Business Intelligence services; and (b) the consolidation of IT employees performing integration services and support.

From 2010 to 2012, labor expenses remained relatively flat.

(b) Non-Labor Expenses

From 2008 to 2010, non-labor expenses remained relatively flat.

From 2010 to 2011, non-labor expenses increased by $1.7 million (or 24 percent). The primary driver of this increase was the addition of supplemental employees needed to support the stabilization of ERP Releases 3 and 4 in the Analytics and Reporting and Enterprise Data Management areas.

From 2011 to 2012, non-labor expenses decreased by $2.5 million (or a reduction of 29 percent). The primary driver of this decrease was the release of the supplemental employees needed for stabilization activities for the implementation of ERP.

3. Estimating Methodology and Test Year Forecast

Table II-10
Enterprise Information Management and Architecture
Comparison Table for FERC Account 920/921
Recorded/Adjusted 2012 to Test Year 2015
(Constant 2012 $000)

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 13,517	$ 11,060	$ (2,457)	OpX Savings
Non-Labor	$ 6,209	$ 5,886	$ (323)	OpX Savings
Total	$ 19,726	$ 16,946	$ (2,780)	

(a) Labor Expenses

For Test Year 2015, we estimate labor expenses of $11.060 million, a reduction of $2.457 million from 2012. Even though historical recorded data indicates the averaging methodology would be an acceptable basis for a forecast of labor expenses, we have chosen the last recorded year as it best represents the most accurate basis for our 2015 request. Using a four-year average instead of the last year recorded would yield less than a 4 percent difference. To that base, an additional request of $0.18 million is added to reflect a company-wide adjustment for severance pay for those affected as explained in Chapter 1, section B of this testimony. This request is partially offset by the reduction in our labor expenses in support of SCE's OpX efforts.

(b) **Non-Labor Expenses**

For Test Year 2015, we estimate non-labor expenses of $5.886 million, a reduction of $0.323 million from 2012. Even though historical recorded data indicates an averaging methodology would an acceptable basis for a forecast of non-labor expenses, we have chosen the last recorded year as it best represents the most accurate basis for our 2015 request. A five-year average would yield a substantially higher base year. To that base, the reduction in our non-labor cost is in support of SCE's OpX efforts.

F. Client Services & Planning

1. Client Services & Planning Division (CS&P)

a) Description of Activities

The Client Services and Planning Division (CS&P) is an IT division that provides support for planning and delivery services to SCE's Operating Unit clients. CS&P's functions include continuous improvement of business process work, and providing controls and business support functions which have impact across IT. CS&P is comprised of Client Portfolio Management Solutions, IT Strategy and General Rate Case (GRC), Delivery Management Organization, Client Engagement and Planning, and Business Support Services.

The Client Portfolio Management (CPM) Solutions group (formerly Business Relations division) supports the strategic and tactical alignment of IT with the SCE internal client Operating Units. Portfolio managers work closely with the leaders from the OUs to understand their business drivers and support the multi-year planning of technology projects, products and services. CPM activities are an important component of validating that the right complement of projects are being pursued, that they are implemented in the right order of priority, and IT capability and technology plans stay in alignment with other SCE Operating Units' business needs. As a result, the CPM team is responsible for the overall demand and capacity management of all work requested of IT. CPM managers serve as the single gateway to all work coming into IT, giving IT and its business clients a better mechanism to coordinate work, minimize duplication, and allocate scarce resources.

CS&P's IT Strategy and General Rate Case (GRC) planning and facilitation group handles all of IT's GRC filing. The GRC group coordinates with SCE's Regulatory Operations and Corporate Finance Operating Units and is held accountable for the final deliverable. While the GRC may not be considered an annual activity, the GRC team works closely with CPM in understanding SCE's Operating Units' business drivers and multi-year planning of technology projects in preparation for the next GRC cycle.

In support of IT's service-oriented operating model, the Delivery Management Organization (DMO) consists of five groups with the following functions:

1. The Project Management Office/Business Process Management (PMOBPM) is a group that provides two functions: the PMO area provides IT project and portfolio management governance and standardized project management approach, while the BPM area provides documented and continuous business process improvements;
2. The Capacity Delivery Management group manages project resources. This includes the analysis of current and future demand for project staff and actively adjusting schedules and loads as conditions change. They also assist in the performance assessment of our project related vendor staff and in the relationships with those companies;
3. The Quality Assurance (QA) and Testing groups provide quality assurance and testing services to assure quality of IT products and services;
4. The Business Controls group manages business controls for delivery of IT products and services to ensure compliance with all relevant company and regulatory requirements as well as our own internal controls that ensure quality, efficiency and timeliness in delivery; and
5. The Delivery Analytics group provides IT performance reporting to many of the IT divisions that rely upon this information to analyze effectiveness of our delivery of products and services. They also make recommendations for improvements in both the data in these reports as well as the most effective means of collection and delivery.

In addition, other DMO functions include:

- Providing governance by establishing policies, processes, procedures and templates for delivery of high quality products and services to IT's clients – SCE's Operating Units.

- Supporting cost reduction by reducing cycle time and/or improving quality of IT business processes through integration of processes, reduction of redundancies, and identifying efficiencies.
- Providing project management support services and ensuring IT's projects are meeting delivery objectives, on or ahead of schedule, and at budget through visibility and tracking of project performance.
- Forecasting capacity and capability needs for projects to optimize resources – both internal resources and resources provided by vendor partners.
- Providing timely actual information through dashboards, reports and metrics on IT work for IT senior management strategic decision making, to optimize performance and contain costs.
- Providing oversight and management of the vendors and their performance by performing quality assurance services such as testing strategies to reduce defects, requirements reconciliation, and consistent testing standards across the IT portfolios.
- Ensuring the company complies with business controls needed for regulatory requirements such as Sarbanes Oxley (SOX), segregation of duties (SOD) and others by engaging in projects from the project/product development phase through testing and implementation.

The Client Engagement and Planning (CEP) group in IT is responsible for providing a variety of services that help employees across SCE use and optimize the company's technology investments. Services provided include solution adoption, technical communication, client surveys, IT benchmarking efforts, management of external research vendor relationships, and management of industry practices and new technology areas to influence IT strategies in support of corporate goals.

Finally, the Business Support Services (BSS) group provides critical back-office, planning, resource, and informal business support services that enable IT managers, employees, and supplemental workers to provide information technology products and services to SCE. BSS helps IT achieve its goal to identify, deliver, and maintain cost effective, secure, and compliant technology required to provide safe, reliable, and affordable electricity. BSS efficiently provides timely, accurate, and consistent onboarding and offboarding of personnel, human capital management (HCM), and business support services in a standardized manner across IT. These services include workforce planning and administration, resource management services, and IT business support.

All CS&P support functions contribute to the effective operation of the IT organization as a whole, which enables effective and efficient technology solutions throughout SCE, and supports the delivery of electricity to our ratepayers. These efforts are progressively helping to reduce the demand for new IT solutions by leveraging existing solutions throughout the enterprise.

b) Metrics Measuring Productivity Results from Information Technology Solutions

Projects for information technology solutions have many different justifications. Some of these include:

- Regulatory mandates
- Technology obsolescence
- Cyber security enhancements
- Grid reliability
- Safety
- Customer satisfaction.

Analysis of the proposed projects from SCE's 2015 GRC would show that most of the requested IT projects fall into one or more of the above categories. A few of the proposed projects have productivity components (e.g. mobility enhancements for field workers) but also have other drivers, including safety. Measuring the productivity components separately from other drivers is very difficult.

True productivity projects (i.e., replacing a manual system with an automated one) are very rare as most of these have been undertaken in the past. There are available metrics that measure those projects that indicate success in preventing productivity loses, but these metrics do not measure productivity gains.

In the case where one of the project's business drivers is productivity gains and a reduction in workforce is expected as a result, SCE's standard business practice is to reduce the Operating Unit's budget for those savings following the final installation of the project. This would ultimately lead to a lower recorded spend (the savings on salaries or contingent worker costs), which would benefit the ratepayer in all subsequent GRC cycles.

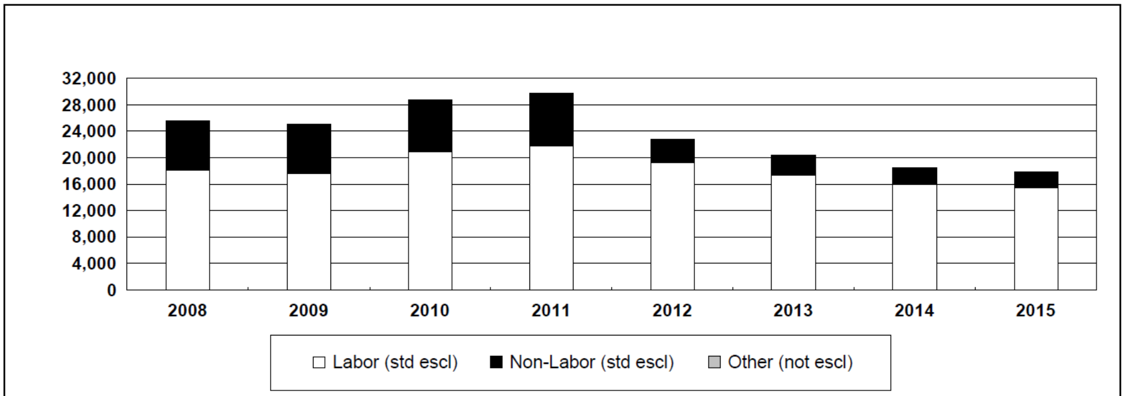
The answer as to whether "reasonable metrics" actually exist to measure productivity results from IT solutions is difficult to answer. Accurate, project-by-project measurement would be difficult and costly. Therefore, we do not, as a common business practice, go back to re-measure worker productivity after a project has gone live to see if we received the benefits we expected. However, by following the practice of reducing workforce previously mentioned, we attain the same end. If we overestimated the benefits of the IT solution, the organizational unit will not be able to do its work with the available reduced resources. If the solution provided greater benefit than we thought then they would have excess capacity or would be able to absorb more work without adding staff. This process occurs as a normal course of business and helps us to self-correct our productivity estimates for future projects.

SCE has provided productivity estimates for all projects where they exist. These can be found in each of the individual project write-ups in SCE-05, Volume 2.

2. Analysis of O&M Expenses by FERC Accounts

a) FERC Account 920/921 – CS&P Client Services and Planning

Figure II-11
Summary of Operations – Client Services & Planning
Accounts 920/921 by Labor/Non-Labor/Other
Recorded 2008-2012 / Forecast 2013-2015
(Constant 2012 $000)



	2008	2009	2010	2011	2012	2013	2014	2015
Labor	18,019	17,591	20,855	21,755	19,267	17,355	15,908	15,440
Non-Labor	7,504	7,504	7,917	8,008	3,514	2,960	2,512	2,376
Other	0	0	0	0	0	0	0	0
Total	**25,523**	**25,095**	**28,772**	**29,763**	**22,781**	**20,315**	**18,420**	**17,816**

← Forecast →

The recorded expenses for Client Services and Planning (CS&P) group consists of all current groups described above as well as the former IT Finance and Human Resources personnel that were consolidated into their corporate functional groups in 2012. For the purposes of the GRC and to simplify the accounting of historical costs, these sub-groups were included in CS&P's historical costs as well as our 2015 request.

(1) Analysis of Recorded Cost

(a) Labor Expenses

Labor cost from 2009 to 2010 increased 16 percent (or $3.3 million) due primarily to the formation of several groups in CS&P. In 2009, Business Support Services group expenses increased by $1.2 million over 2008 base. The increase can be primarily attributed to the formation of a dedicated Division Support group for the Center for Continuous Improvement (CCI). In addition, the Division Support group for non CCI work further increased due primarily to the increase in project demands in IT's TDM division. The Delivery Management Organization (DMO) experienced growth of over $1.1 million from 2009-2010 due the addition of resources in CS&P's DMO group in areas of Program Management Office, delivery testing and business delivery. These additional resources were necessitated by the growing demand in the Operating Units as projects were being approved and additional project support was required. Enterprise Portfolio Management group experienced a growth of approximately $0.700 million as a result of ERP Phase 3 going live which necessitated additional end user and process support.

Client Portfolio Management experienced a growth of $0.43million driven by the addition of dedicated Business Unit Executive support for the Customer Service, Transmission and Distribution and SONGS technology portfolio. This provided the operating units with dedicated and focused leadership, strategic and tactical accountability, and in-depth, portfolio management which further leveraged the skills, expertise, and knowledge of IT in delivering effective and efficient technology solutions. In addition, the growth of $0.575 million in Enterprise Integration was driven by the formation of new functional groups, Process Management and Project Governance, to further provide in-depth portfolio management support.

From 2011 to 2012, labor expenses decreased by 11 percent (or a reduction of $2.5 million) due primarily to the company-wide support of the operational excellence (OpX) effort. To support OpX, the Client Portfolio Management group (CPM reduced resources by attrition, and consolidated responsibilities to avoid interruptions in CPM support to SCE's Operating Units.

(b) Non-Labor Expenses

Non-Labor expenses remained relatively flat from 2008 to 2011.

From 2011 to 2012, expenses decreased 56 percent (or $4.5 million) due primarily to the company-wide support of the OpX effort by conservatively reducing non-labor expenses in all areas of CS&P. Overall reductions in IT included reductions in employee recognition such as bonuses and awards, year-end events, training, and office supplies.

(2) Estimating Methodology and Forecast

Table II-11
Client Services & Planning
Comparison Table for FERC Account 920/921
Recorded/Adjusted 2012 to Test Year 2015
(Constant 2012 $000)

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ 19,267	$ 15,440	$ (3,827)	OpX Savings
Non-Labor	$ 3,514	$ 2,376	$ (1,138)	OpX Savings
Total	$ 22,781	$ 17,816	$ (4,965)	

For Test Year 2015, we estimate labor expenses of $15.440 million, a reduction of $3.827 million below 2012. Labor expenses have fluctuated from year to year; the averaging methodology would have been an appropriate methodology for forecasting this area. However, we have selected last year recorded as it represents the most accurate base year for our 2015 forecast as well as being a lower base than an averaging methodology would have yielded. In 2015, labor expenses decreased in support of the OpX initiative referenced in this testimony. Our forecast also includes $0.18 million for severance pay for those affected as explained in the overview section of this testimony.

(a) Non-Labor Expenses

For Test Year 2015, we estimate non-labor expenses of $2.376 million, a $1.138 million reduction below 2012. Non-Labor expenses have fluctuated from year to year; the averaging methodology would have been an appropriate methodology for forecasting this area. However, we have selected last recorded year as it represents the most accurate base for our 2015 Forecast as well as being a lower base than an averaging methodology would have yielded. The decrease in 2015 non-labor expenses can be attributed to savings from OpX initiative, referenced in this testimony. We forecast spending to continue at that lower level.

G. Incremental O&M for New Software

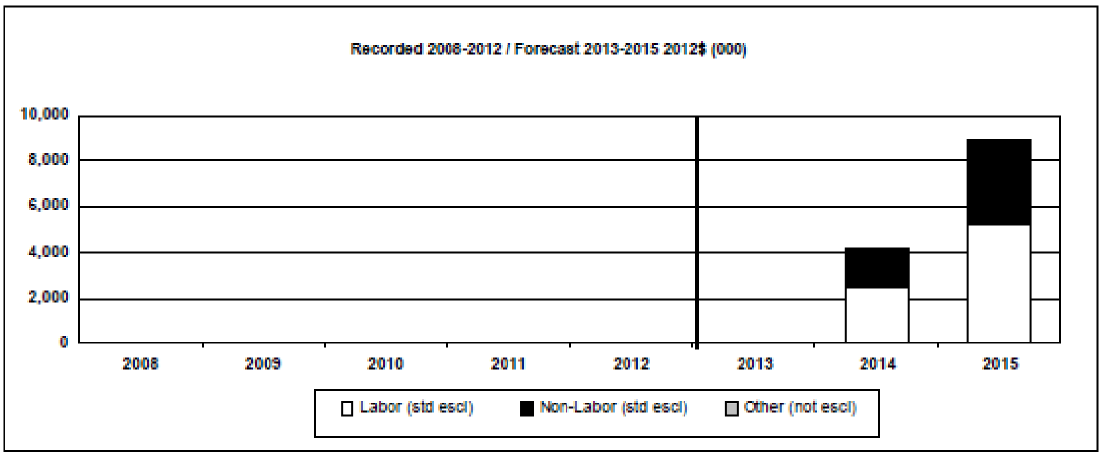
a) Description of Activities

Each year, the applications supported by IT change as some systems are decommissioned and others are added. When large application projects that exceed $5 million in capital spend are implemented, the O&M recurring support costs are too significant to be simply included as part of the application portfolio. These post-implementation support costs begin in the year following the implementation of the project. This activity aims to identify the O&M costs related to these large projects and account for them appropriately.

b) Analysis of O&M Expenses for New Software Application by FERC Account

(1) FERC Accounts 920/921 – O&M for New Software Applications

Figure II-12
Summary of O&M for New Software Applications
Accounts 920/921 by Labor/Non-Labor/Other
Recorded 2008-2012 / Forecast 2013-2015
(Constant 2012 $000)



Forecast Expenses (constant 2012$)		Recorded Period $ (000) 2008	2009	2010	2011	2012	2013	2014	2015
Labor	(standard escalation)	0	0	0	0	0	0	2,487	5,222
Non-Labor	(standard escalation)	0	0	0	0	0	0	1,754	3,682
Other	(not escalatable)	0	0	0	0	0	0	0	0
Total		0	0	0	0	0	0	4,241	8,904

(a) Analysis of Recorded Costs

The O&M forecast is comprised of costs for the ongoing operation and maintenance of new software applications. Since these costs are to support assets which did not exist in the recorded period, there is no recorded history for these costs.

(b) Estimating Methodology and Test Year Forecast

Table II-12
Incremental O&M for New Software
Comparison Table for FERC Account 920/921
Recorded/Adjusted 2012 to Test Year 2015
(Constant 2012 $000)

O&M Expenses	2012 Recorded/ Adjusted	2015 Test Year	Variance	Drivers
Labor	$ -	$ 5,222	$ 5,222	Various projects >$5 million
Non-Labor	$ -	$ 3,682	$ 3,682	Various projects >$5 million
Total	$ -	$ 8,904	$ 8,904	

The 2015 forecast of $8.904 million is an average of forecast years 2015-2017 that have been normalized for ratemaking purposes. Current estimates have been allocated 59 percent to labor and 41 percent to non-labor using 2012 actual / recorded costs breakdown. These are new costs to support assets in our forecast, therefore, there is no recorded history for these costs.

The Table II-13 below lists the projects in this forecast along with the corresponding references to the IT Capital testimony where the analysis and calculation of the costs for the ongoing operations and maintenance can be found. Further detail of the project yearly cost breakdown can be found in the accompanying workpapers.[62]

[62] *See* workpaper entitled "2015 GRC SCE-05 Vol. 1 -- Capital Projects Used for O&M Analysis."

Table II-13
Capital Projects Used for O&M Analysis
For Test Year Forecast O&M

	Description	CIT	Capital Forecast 2013 - 2017	Recurring O&M Test-Year Forecast	Capital Project Testimony Reference
1	SCE.com/CRM Integration	**CIT-00-DM-DM-000032**	$ 38,700.0	$ 259.8	SCE-05, Vol. 2, Ch. 6
2	Interior Defense	**CIT-00-TR-RM-000004**	$ 34,760.5	$ 506.7	SCE-05, Vol. 2, Ch. 2
3	eDMRM (Enterprise Document Management/Records Management)	**CIT-00-SD-PM-000144**	$ 32,604.0	$ 130.0	SCE-05, Vol. 2, Ch. 6
4	NERC CIP	**CIT-00-TR-RM-000001**	$ 28,225.8	$ 475.0	SCE-05, Vol. 2, Ch. 3
5	Geographic Information System (GIS)	**CIT-00-SD-PM-000009**	$ 27,595.1	$ 1,320.0	SCE-05, Vol. 2, Ch. 6
6	Common Cyber Security Services (2015 - 2017)	**CIT-00-SD-PM-000175**	$ 25,371.0	$ 1,120.0	SCE-05, Vol. 2, Ch. 2
7	Perimeter Defense	**CIT-00-TR-RM-000002**	$ 25,328.8	$ 230.5	SCE-05, Vol. 2, Ch. 2
8	Data Protection	**CIT-00-TR-RM-000003**	$ 23,061.5	$ 436.8	SCE-05, Vol. 2, Ch. 2
9	MSO Integrated Work Management	**CIT-00-DM-DM-000025**	$ 21,666.3	$ 367.2	SCE-05, Vol. 2, Ch. 6
10	Renewable Contract Management System	**CIT-00-SD-PM-000112**	$ 20,520.0	$ 530.0	SCE-05, Vol. 2, Ch. 6
11	CRAS Application	**CIT-00-SD-PM-000102**	$ 18,872.0	$ 125.8	SCE-05, Vol. 2, Ch. 6
12	Cell Relays	**CIT-00-OP-NS-000383**	$ 17,300.0	$ 26.3	SCE-05, Vol. 2, Ch. 6
13	Enhanced Meter and Usage Capability	**CIT-00-SD-PM-000105**	$ 16,600.0	$ 70.0	SCE-05, Vol. 2, Ch. 6
14	Consolidated Mobile Solution (CMS)	**CIT-00-SD-PM-000041**	$ 16,032.0	$ 220.0	SCE-05, Vol. 2, Ch. 6
15	Common Cyber Security Services (2013 - 2014)	**CIT-00-SD-PM-000103**	$ 15,239.3	$ 1,104.0	SCE-05, Vol. 2, Ch. 2
16	Distribution Management System (DMS)	**CIT-00-SD-PM-000140**	$ 13,144.0	$ 175.0	SCE-05, Vol. 2, Ch. 6
17	Phasor Advanced Analytics	**CIT-00-SD-PM-000202**	$ 13,100.0	$ 131.7	SCE-05, Vol. 2, Ch. 6
18	Master Access Project Umbrella	**CIT-00-SD-PM-000136**	$ 12,356.0	$ 210.0	SCE-05, Vol. 2, Ch. 6
19	Customer Service System Enhancements	**CIT-00-DM-DM-000017**	$ 12,000.0	$ 136.5	SCE-05, Vol. 2, Ch. 6
20	Vegetation Management	**CIT-00-SD-PM-000154**	$ 10,500.0	$ 105.0	SCE-05, Vol. 2, Ch. 6
21	Electronic Work Order Package	**CIT-00-SD-PM-000189**	$ 10,000.0	$ 166.7	SCE-05, Vol. 2, Ch. 6
22	Grid Control Center Cyber Security	**CIT-00-CC-CC-000027**	$ 9,000.0	$ 300.0	SCE-05, Vol. 2, Ch. 6
23	Security Operation Center (SOC)	**CIT-00-SD-PM-000138**	$ 7,688.7	$ 128.2	SCE-05, Vol. 2, Ch. 6
24	SONGS Cybersecurity	**CIT-00-CC-CC-000028**	$ 7,500.0	$ 83.3	SCE-05, Vol. 2, Ch. 2
25	Pole-Loading Application Replacement (PoLAR)	**CIT-00-SD-PM-000137**	$ 7,067.8	$ 118.0	SCE-05, Vol. 2, Ch. 6
26	Enterprise Compliance Management System	**CIT-00-SD-PM-000064**	$ 7,000.0	$ 87.5	SCE-05, Vol. 2, Ch. 6
27	GRC Phase II Non-Dynamic Pricing Rates	**CIT-00-SD-PM-000170**	$ 6,500.0	$ 49.0	SCE-05, Vol. 2, Ch. 6
28	Protection System Maintenance Program (PSMP)	**CIT-00-SD-PM-000153**	$ 6,200.0	$ 85.0	SCE-05, Vol. 2, Ch. 6
29	Storm Analytics	**CIT-00-SD-PM-000195**	$ 5,900.0	$ 78.7	SCE-05, Vol. 2, Ch. 6
30	Grid Visualization - Building the GCC Digital Wall	**CIT-00-SD-PM-000203**	$ 5,900.0	$ 20.0	SCE-05, Vol. 2, Ch. 6
31	SmartConnect Monitor&Analysis (SCMAS)	**CIT-00-SD-PM-000172**	$ 5,100.0	$ 39.7	SCE-05, Vol. 2, Ch. 6
32	FASB Projects (Multiple)	**CIT-00-SD-PM-000141**	$ 5,040.0	$ 67.4	SCE-05, Vol. 2, Ch. 6
			$ 505,872.6	**$ 8,903.6**	

III.

CAPITAL EXPENDITURES

A. Hardware Replacement

1. Overview

SCE's IT Operating Unit (IT) oversees a wide array of information technology hardware. Computing assets are comprised of the computing hardware used by the SCE workforce and SCE customers. Communication assets include the Voice Over Internet Protocol (VOIP) phone solutions used in SCE facilities and radios used in the field. Networking assets including fiber optic cable, satellites, microwave towers, and routers, which allow for the transportation of customer and internal SCE data traffic. Mailing Operations assets are the high volume printers and bill inserters used to print, insert, and mail customer bills, letters, and checks.

Following industry best practices, we manage these assets by ensuring they are put into service and remain functionally capable over the assets' useful life. Over the past several years, four factors required us to optimize how we manage our portfolio of hardware assets.

First, the increasing use of technology, information, and data throughout our business requires our portfolio of hardware assets that support ongoing utility business operations to grow in size and complexity. This is growth in both in terms of the number of devices and hardware systems supported, as well as the volume of business transactions supported. For example, developments in hardware capability, such as virtualization and the convergence of data, voice, and video in the communications arena, has significantly impacted how related hardware is managed. Additionally, enterprise Information Technology initiatives such as Edison SmartConnect® and Enterprise Resource Planning (ERP) have added significant hardware components to our portfolio.

Second, growing business needs and rapid developments in information technology are impacting our hardware requirements. Our hardware asset portfolio includes 23,500 personal computers, 4,800 mobile radios, over 3,900 miles of fiber optic communications cable, over 1,100 midrange servers, three mainframe servers, and over 16.4 petabytes of storage. These assets support printing 179 million pages of documents per year, responding to over 14.5 million customer calls to our call centers, voice and data communications required by field operations employees and providing energy to our 4.9 million customers. The vast majority of our hardware portfolio is required to be operational 24 hours a day, seven days a week, 365 days a year.

Third, the way our customers and business partners are interacting with us continue to change. The internet and wireless communication capabilities continue to become increasingly important. These changes drive growth in capacity and security for our hardware infrastructure. Some examples include our continuing effort to upgrade the capacity of our communications network, and our hardware-related investments required to ensure information and data security.

Fourth, although regulatory requirements and mandates have always been a significant factor influencing our actions, recent mandates that reflect governmental agencies' concerns over emerging market and industry developments require major new information technology investments with enterprise-wide impacts. The Market Restructuring and Technology Update requirements, the North American Electric Reliability Corporation's Critical Infrastructure Protection (NERC CIP) mandates related to cyber security, and the continuing impacts of the Sarbanes-Oxley legislation are just a few of these regulatory mandates. These mandates affect decisions regarding SCE's Information Technology infrastructure capacity and capability along with computing, communications, network and mail operations areas. Their requirements drive actions relevant to application and data segregation, securing of server services and information life cycle management.

Due to these changing needs and developments, the hardware asset portfolio will become obsolete if not actively managed and refreshed (replaced), which can cause a significant impact on business operations. Operating plans and budgets are developed giving due consideration for supporting the proactive refresh approach discussed in this section on Capital Expenditures.

In conclusion, our infrastructure hardware assets are an integral part of our business operations, and are necessary to deliver service to our 4.9 million customers. Call centers, field personnel, and automated distribution and control systems are all dependent upon hardware assets to perform their duties and functions while maintaining a safe working environment. Our infrastructure hardware assets suffer from the same phenomenon of age-related degradation as do many of our more publicly visible transmission and distribution equipment assets. For the reasons described earlier, hardware decisions increasingly cannot be made on a stand-alone basis, and need to be made at a portfolio level, considering impacts to SCE's overall hardware infrastructure.

2. Mainframe Servers

Table III-14
Work Breakdown Structure (WBS) ID and Description

WBS ID	Description
CIT-00-OP-CS-000004	Mainframe Servers

a) Background

Mainframe servers are powerful computers used for critical business applications and work flow systems integral to providing high reliability and security for SCE's business operations. Examples of such systems include the Customer Service System and data warehousing. The mainframe servers also support operations for calculating, printing, and mailing bills to SCE's 4.9 million customers, paychecks to SCE's approximately 20,000 employees, and payment checks to SCE's suppliers.

b) Business Requirements

The Customer Services System (CSS) provides multiple operational functions supporting the Customer Care[63] and billing processes running on the mainframe. CSS is essential in providing accurate and timely customer bills, tracking SCE receivables, and creating and tracking field service orders (e.g., turning a customer's electric service "on" or "off"). Since CSS generates approximately 224,000 customer bills and letters each business day, even a one-day outage can have a significant impact. CSS is also used to manage customer relationships, initiate new service requests, schedule and track service calls, and bill for products and services. All of these activities are supported by the mainframe.

The Gartner Group, a leading expert in the industry, recommends mainframe server life cycles should be five years.[64] SCE follows this recommendation, and the SCE lifecycle time frame for mainframe servers is five years. If the mainframe servers stay in service past their five-year life cycle, these servers may be more prone to problems or failures as they age, negatively affecting service to our customers. Additionally, refreshing mainframe servers increases performance and enables

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[63] Customer Care is a specific Customer Service Operational Unit (CSOU) outreach program. The CARE program (California Alternate Rates for Energy also known as CARE) offers income-qualified customers a discount of 20% or more off their electric bill.

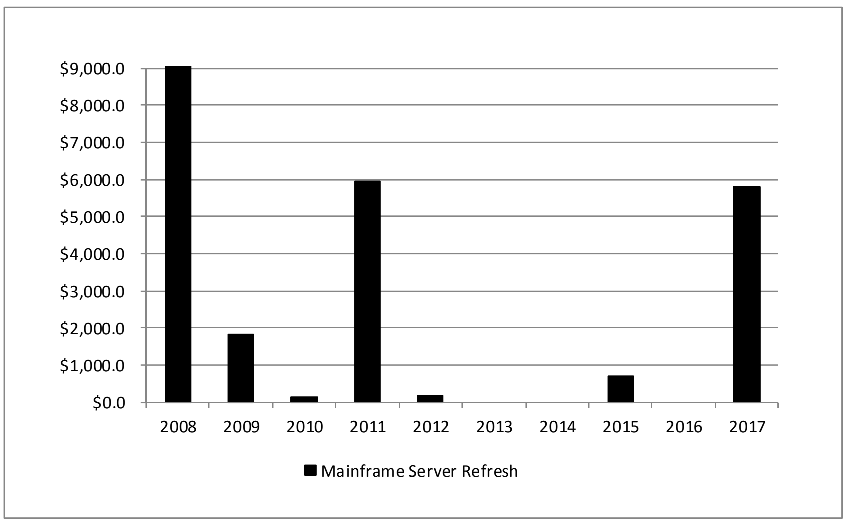
[64] *See* workpaper entitled "Gartner: Extend the Life of your Server."

better reliability and security needed to provide service to our customers. Also, if not refreshed within five years, additional operating expenses will be needed to maintain the mainframe servers.

c) Recorded and Forecast Expenditures

SCE recorded $18.279 million for the period 2008-2012 for Mainframe Servers Refresh and forecasts expenditures of $6.515 million, a 64 percent decrease, for the period 2013-2017 as depicted in Figure III-13 below.

Figure III-13
Mainframe Server Refresh Expenditure
Recorded 2008-2012 and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (2015 case)				
	2008	**2009**	**2010**	**2011**	**2012**	2013	2014	2015	2016	2017
Mainframe Server Refresh	$10,219.3	$1,828.3	$132.6	$5,933.4	$165.7	$0.0	$0.0	$715.0	$0.0	$5,800.0
Total	**$10,219.3**	**$1,828.3**	**$132.6**	**$5,933.4**	**$165.7**	**$0.0**	**$0.0**	**$715.0**	**$0.0**	**$5,800.0**

(1) Recorded Expenditures

The expenditures in the recorded period were primarily driven by refresh of mainframe servers at the end of useful life.

In 2008 we spent $10.219 million to refresh mainframe servers at the end of useful life.

In 2009 we spent $1.828 million to acquire additional processor capacity to support transaction processing performance needed for our CSS.

In 2010 we spent $133,000 for additional mainframe network capacity.

In 2011 we spent $5.933 million to refresh mainframe servers at the end of useful life.

In 2012 we spent $166,000 for additional mainframe network capacity.

(2) Forecast Expenditures

For the period 2013-2017 our mainframe server forecast expenditures consist of two major drivers: (1) refresh of mainframe servers and components at the end of useful life and (2) system capacity increases for memory and processor additions to primarily handle CSS transaction processing needs.[65] To develop an accurate Mainframe Server Refresh forecast, we identified the mainframe servers needing to be refreshed in the forecast period, and used the 2011 purchase price of those servers as the basis for our forecast.

We plan on retaining IBM as the vendor to provide mainframe servers. IBM is the dominant vendor in the mainframe market providing solutions meeting our business requirements. Leading up to the 2017 refresh purchase, we will benchmark pricing using third-party industry analysis to validate we are receiving favorable pricing. All other forecast amounts were obtained by using previous purchasing quotes from IBM for similar items.

In 2013 and 2014 we have no forecast expenditures because the mainframe servers will have remaining useful life and will not require refresh. In addition, no system capacity performance increases will be required.

In 2015 we estimate $715,000 to acquire additional processor capacity to support transaction processing performance needed for our CSS.

In 2016 there are no forecast expenditures because the mainframe servers will have remaining useful life and will not require refresh. In addition, no system capacity performance increases will be required.

In 2017 we estimate $5.800 million to refresh mainframe servers. These servers support CSS, which supports Customer Care and Billing business processes, which use the mainframe systems. CSS is essential in providing accurate and timely customer bills, tracking SCE receivables, and creating and tracking field service orders (e.g., turning a customer's electric service "on" or "off").

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65 *See* workpaper entitled "MIPS recorded and forecasted."

d) Conclusion

The mainframe server computing environment is an essential part of SCE's Information Technology and business operations. Critical applications such as CSS run in this environment. Our estimated expenditures are necessary to maintain the reliability, availability, serviceability, and security of our mainframe server computing environment. Other forecast expenditures are needed to acquire additional processor capacity to support transaction processing performance needed to provide services to our customers.

3. Midrange Enterprise Servers Hardware

Table III-15
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-CS-000008	Midrange Servers
CIT-00-OP-CS-000011	Non-UNIX Servers
CIT-00-OP-CS-000014	Servers for TDBU
CIT-00-OP-CS-000016	EA-Enterprise Application Integration-Refresh
CIT-00-OP-CS-000017	IDE-Integrated Development Environment-Refresh
CIT-00-OP-CS-000018	EA-Identity Management-Refresh
CIT-00-OP-CS-000021	CDAS HW Refresh
CIT-00-OP-CS-000022	SCE.com
CIT-00-OP-CS-000042	CCO Server Refresh
CIT-00-OP-CS-000044	Smart Connect Operational Data Store
CIT-00-OP-CS-000052	Cloud Computing Infra - Refresh
CIT-00-OP-CS-000057	Cloud Computing Software (CIAC,VCD)
CIT-00-OP-DC-000001	Data Center
CIT-00-OP-OM-00001	Integrated Test Environment (ITE)
CIT-00-DM-DM-000009	EMS Refresh

a) Background

Midrange servers consist of the hardware and associated operating systems supporting SCE's critical business applications such as Enterprise Resource Planning (ERP), Edison SmartConnect®, and Outage Management System (OMS). Midrange servers are a class of computers in the middle of the computing spectrum between mainframe and personal computers. Since the 1980s, when client server computing became predominant, the majority of business applications utilize the midrange platform to best serve their business processing needs.

b) Business Requirements

Midrange servers are part of the computing infrastructure necessary to maintain highly available, reliable, and secure core business operations for SCE. Industry expert Gartner Group recommends server life cycles should be five years.[66] SCE follows this recommendation, and the SCE lifecycle time frame for midrange servers is five years. If the midrange servers stay in service past their five-year life cycle, they can be more prone to extended outages due to lack of spare parts and outdated firmware, and this can negatively impact our client and business operations. Additionally, the replacements of midrange servers increase server performance, reliability, accessibility and serviceability for our customers. Refreshing the midrange servers help us provide adequate service for our customers. If not refreshed within five years, additional operating expenses will be needed to maintain the midrange servers.

Where possible, SCE uses a virtualized server architecture[67] to deliver critical business functions to our customers. This technology enables us to run multiple applications on a single physical server. These shared, virtual environments often even contain consolidated computing, storage, and network capability. This increased virtualization reduces the cost associated with maintaining these servers as well as the physical space and complexity when conducting our server refresh activities. This architecture is also known as converged infrastructure vertical platforms.

Converged infrastructure vertical platforms allow for quicker and more affordable set up for projects and other requests with a focus on pre-built, pre-packaged, and standardized infrastructure capacity. With increased utilization of these platforms, IT can more effectively manage capacity usage, create on-demand capabilities, provide a self-service catalog, as well as deliver desired solutions quickly and at substantially lower overall costs.

c) Recorded and Forecast Expenditures

SCE recorded $144.5 million for the period 2008-2012 for the acquisition of midrange server hardware and converged infrastructure vertical platforms, and forecasts expenditures of $128.0 million, an 11 percent decrease, for the period 2013-2017 as depicted in Figure III-14 below.

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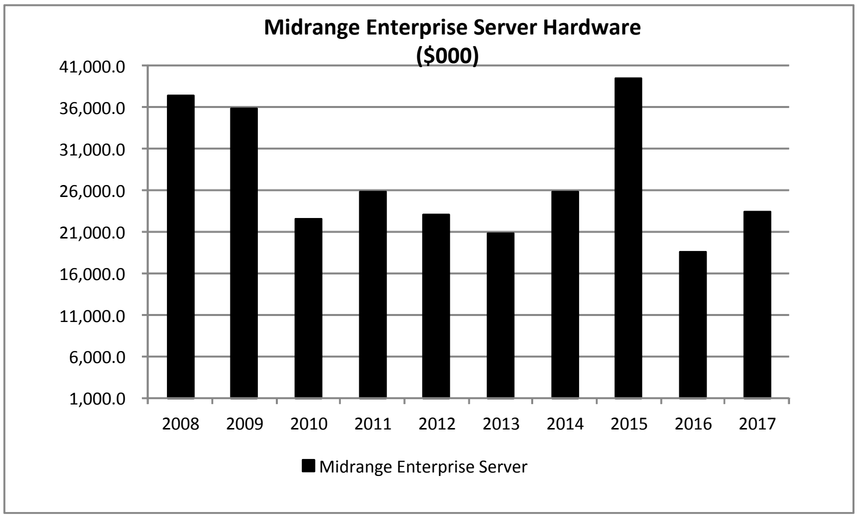
66 *See* workpaper entitled "Gartner: Extend the Life of your Server."

67 "Virtualization" is the term used to describe using one or many severs for multiple applications to improve utilization.

Figure III-14
Midrange Enterprise Server Refresh Expenditure
Recorded 2008-2012 and Forecast 2013-2017
(Nominal $000)



WBS ID
CIT-00-OP-CS-000004
CIT-00-OP-CS-000011
CIT-00-OP-OM-00001
CIT-00-OP-CS-000014
CIT-00-OP-CS-000042
CIT-00-OP-CS-000016
CIT-00-OP-CS-000017
CIT-00-OP-CS-000018
CIT-00-OP-CS-000021
CIT-00-OP-CS-000044
CIT-00-OP-CS-000022
CIT-00-OP-CS-900000

	Recorded					Forecast				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Midrange Enterprise Server	37,425.7	35,755.7	22,505.8	25,759.6	23,020.5	20,790.3	25,749.8	39,503.6	18,558	23,414
Total	**37,425.7**	**35,755.7**	**22,505.8**	**25,759.6**	**23,020.5**	**20,790.3**	**25,749.8**	**39,503.6**	**18,558**	**23,414**

(1) Recorded Expenditures

The recorded expenditures for 2008-2012 include costs for acquiring, building, configuring, and testing midrange servers and converged infrastructure vertical platforms for new projects and existing servers at the end of useful life. The expenditures in the recorded period were primarily driven by the implementation of multi-year projects such as Enterprise Resource Planning, Edison SmartConnect®, Energy Management System, Information Security Program, Outage Management System, Market Redesign Technology Upgrade, Distribution Service Request Pricing, Call Center Optimization and other cybersecurity requirements.

In 2008 we spent $37.426 million for midrange servers to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2009 we spent $35.756 million for midrange servers to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2010 we spent $22.506 million for midrange servers to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2011 we spent $25.760 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2012 we spent $23.020 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

(2) Forecast Expenditures

The forecast expenditures of $128.035 million for the period 2013-2017 include costs for acquiring, building, configuring, and testing midrange servers and converged infrastructure vertical platforms for new projects, and refreshing existing servers at the end of useful life. Our increased utilization of converged vertical platform yields reductions in cost required to refresh midrange servers through reduced maintenance, increased infrastructure efficiency, increased IT service availability, and reduced manual provisioning tasks, as reflected by the 11 percent reduction in forecast spend for 2013-2017 compared to the 2008-2012 recorded spend.[68],[69] The expenditures in the forecast period are primarily driven by the refresh of midrange servers for multi-year projects such as Enterprise Resource Planning, Edison SmartConnect®, Energy Management System, Information Security Program, Outage Management System, Distribution Service Request Pricing, Call Center Optimization, and various cybersecurity requirements.

In 2013 SCE estimates $20.790 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2014 SCE estimates $25.750 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

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68 *See* workpaper entitled "Potential Savings from Converged Infrastructure – Vertical Model.pptx."

69 *See* workpaper entitled "Project Cost Estimate Summary 2015 Cloud Computing."

In 2015 SCE estimates $39.504 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2016 SCE estimates $18.558 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

In 2017 SCE estimates $23.414 million for midrange servers and converged infrastructure vertical platforms to support the implementation of multi-year projects as mentioned above as well as to refresh midrange servers at the end of useful life.

d) Conclusion

The midrange server computing environment is an essential part of SCE's computer operations. Critical applications such as Enterprise Resource Planning, Edison SmartConnect®, Energy Management System, Information Security Program, Outage Management System, Market Redesign Technology Upgrade, Distribution Service Request Pricing, and Call Center Optimization run in this environment. Our requested forecast expenditures are intended to maintain the reliability, availability, serviceability, and security of our midrange server computing environment. All of these activities are critical, and the refresh of the midrange server environment will allow us to provide adequate services to our customers.

4. Disk and Tape Storage Refresh

Table III-16
Disk and Tape Storage Refresh
Work Breakdown Structure(WBS) ID and Description

WBS ID	**Description**
CIT-00-OP-CS-000005	Mainframe Disk Storage
CIT-00-OP-CS-000006	Mainframe Tape Storage-CWIP
CIT-00-OP-CS-000009	Midrange Storage
CIT-00-OP-CS-000010	Client/Project Storage Growth
CIT-00-OP-CS-000012	Non-UNIX Disk Storage
CIT-00-OP-CS-000013	Non-UNIX Tape Storage
CIT-00-OP-CS-000020	Client Driven Hardware
CIT-00-OP-CS-000043	Database Storage Growth due to enhancements in backup utilities
CIT-00-OP-CS-000050	Smart Connect Operational Data Store for storage
CIT-00-OP-CS-000037	IT Capacity Expansion

a) Background

Disk and tape storage is the computer storage medium designed for enterprises with requirements for high scalability, reliability, and fault tolerance.[70] SCE utilizes the following three primary categories of disk and tape storage: (1) Online disk storage - large disk array solutions, which minimize access time to data, and maximize reliability; (2) Tape Backup Storage - off-line storage to protect data using tape libraries; (3) Archiving - technically similar to tape backup storage, but its purpose is long-term retention, management, and discovery of fixed content data to comply with regulatory requirements.

SCE continues to use a virtualized approach, which enables storage to support the requirements of multiple servers and platforms. Virtualization allows SCE to add, replace or remove physical storage units without shutting down a server, and provides additional layers of security for storage. In the absence of virtualization we would need to interrupt the availability of applications to add, replace or remove storage.

Along with tape and disk storage, other components are required to store and back up company data. If any one of the these components falls out of service or malfunctions, then the reliability, accessibility, serviceability and recoverability of SCE's data would be in jeopardy. Some of the other key components include:

- Peer To Peer Remote Copy (PPRC) software is used to transfer data between mainframe storage at alternate data centers.
- Cisco Directors transfer data from the client application servers to disk and tape storage.
- SAN volume controllers dynamically manage and change storage without application interruptions.
- Virtual Storage Managers (VSMs) and Virtual Tape Library (VTL) devices are disk storage acting as a tape library. These devices speed up the process of backing up and restoring for the mainframe (VSM) and midrange environments (VTL).

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[70] Fault tolerance allows the system to stay available even when a part of the system fails.

- Tape silos are shared backup devices housing tape drives and tape media to backup and restore client data.
- Tape drives are data storage devices which read and write data stored on tape media.

b) Business Requirements

SCE uses disk and tape storage to store and recover all required business data, such as customer information, company financial data, and employee-related data, as required by project or regulatory demands. SCE replaces its disk and tape storage on the industry standard five-year life cycle used for server hardware. If not refreshed within five years, additional operating expenses will be needed to maintain disk and tape storage. The refresh of the storage hardware helps to ensure reliability, availability, security, and recoverability of key utility functions and data to support projects and to help ensure compliance with regulatory and security requirements.

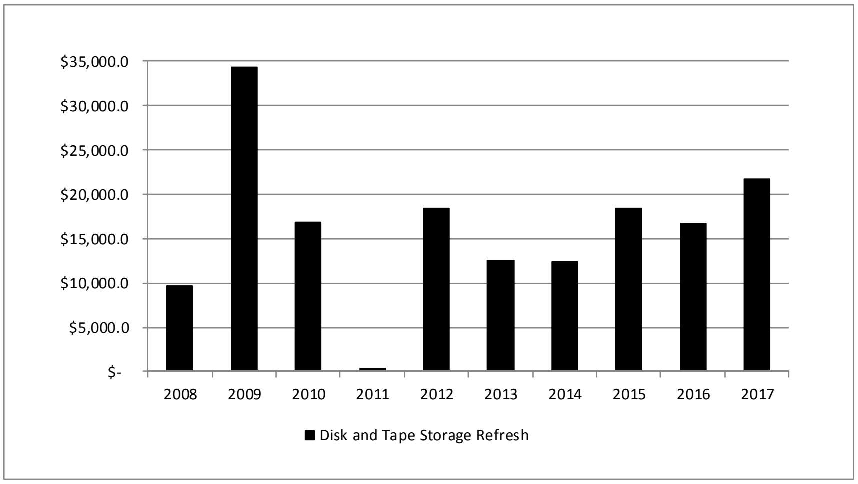
In addition to replacement to avoid obsolescence and hardware failure, the current applications continue to drive the need for expanded storage requirements. This growth is caused by several factors including the need to ensure compliance with regulatory and security requirements. As an example, it is a corporate requirement to store the company's financial data for a minimum of seven years. This requires additional tape storage each year as this data is archived. In order to meet existing and emerging complex regulatory and legal requirements, we expect this trend to continue.

As applications continue to use different types of non-text based data, such as high resolution image files, the need for additional storage space increases. These files are extremely data intensive (i.e., they require more storage space) and if archived, need yet additional tape storage. As applications improve and progress, the trend towards using and storing more complex data will accelerate.

c) Recorded and Forecast Expenditures

SCE forecasts recorded $79.459 million for the period 2008-2012 for disk and tape storage refresh and is requesting expenditures of $81.757 million, a 3 percent increase, for the period 2013-2017 as depicted in Figure III-15 below.

Figure III-15
Disk and Tape Storage Refresh Expenditure
Recorded 2008-2012 and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Disk and Tape Storage Refresh	$ 9,631.7	$ 34,282.0	$ 16,835.4	$ 296.3	$18,413.6	$ 12,578.0	$ 12,396.6	$ 18,425.0	$16,710.0	$ 21,647.2
Total	**$ 9,631.7**	**$ 34,282.0**	**$ 16,835.4**	**$ 296.3**	**$18,413.6**	**$ 12,578.0**	**$ 12,396.6**	**$ 18,425.0**	**$16,710.0**	**$ 21,647.2**

(1) Recorded Expenditures

The 2008 to 2012 recorded expenditures fluctuated year to year depending on the type and quantity of storage units acquired each year.[71]

In 2008 we spent $9.632 million for disk and tape storage and components at the end of useful life and growth from projects including Cisco Directors, SAN virtualization controllers, tape silos, virtual storage managers and virtual tape libraries.

In 2009 we spent $34.282 million. $26.861 million was spent to refresh disk and tape storage and components at the end of their useful life and growth from projects including Cisco Directors, a tape silo, and virtual tape libraries. $7.241 million was spent for a teradata online disk storage device used to support Edison SmartConnect® data warehouse requirements.

In 2010 we spent $16.835 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual

[71] This footnote intentionally left blank.

storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecast disk and tape storage enterprise growth.

In 2011 we spent $296,000 for disk and components at the end of useful life and growth from projects including Virtual storage managers.

In 2012 we spent $18.414 million for disk and tape storage and components at the end of useful life and growth from projects including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecast disk and tape storage enterprise growth.

(2) Forecast Expenditures

For the period 2013-2017, we estimate $81.757 million to refresh the disk and tape storage and components at the end of useful life and to provide increased storage capacity required to meet the forecast enterprise growth in data and demand for storage, which is a 2.9 percent increase from the 2008-2012 recorded spend.[72]

To develop an accurate disk and tape storage forecast, we identified the disk and tape storage at the end of useful life and used vendor quotes as the basis of our forecast. Edge Solutions was selected as a strategic business partner after responding to and winning a competitive Request For Proposal for providing storage solutions.[73] Edge Solutions will meet our storage business requirements and is a Diverse Business Enterprise (DBE) supplier, helping to fulfill SCE's supplier diversity requirements as established in CPUC's General Order 156.

In 2013 we estimate $12.578 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecast growth in demand for disk and tape storage.

In 2014 we estimate $12.397 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecast growth in demand for disk and tape storage.

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[72] *See* workpaper entitled "Forecast Expenditures for Disk and Tape Storage Refresh."

[73] *See* workpaper entitled "DSS Pricing Matrix." Edge Solutions is the authorized reseller for Direct Systems Support.

In 2015 we estimate $18.425 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecast growth in demand for disk and tape storage.

In 2016 we estimate $16.710 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for growth in demand forecasted for disk and tape storage.

In 2017 we estimate $21.647 million for the refresh of disk and tape storage and components at the end of useful life including SAN virtualization controllers, tape silos, virtual storage managers, virtual tape libraries, and additional tape drives, as well as to accommodate for forecasted for disk and tape storage.

d) Conclusion

Building and maintaining disk and tape storage is an essential part of SCE's computer operations. Critical applications such as Enterprise Resource Planning, Customer Service System, Edison SmartConnect®, Energy Management System, Information Security Program, Outage Management System, Market Redesign Technology Upgrade, Distribution Service Request Pricing, and Call Center Optimization operate in this environment. Our requested forecast expenditures are intended to maintain reliability, availability, security, and recoverability of our disk and tape storage and its data. All of these activities are critical, and the refresh of our disk and tape storage will allow us to provide adequate services to our customers and effectively run our business.

5. High Volume Printers and Bill Inserters Refresh

Table III-17
High Volume Printers and Bill Inserts Refresh
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-CS-000007	High Volume Printers and Bill Inserters
CIT-00-OP-SM-000020	High Volume Printers and Bill Inserters

a) Background

SCE uses large high speed and high volume production printers and inserters located at SCE facilities in Rosemead and Irvine, California. These devices are used to print, insert and mail customer bills, letters, payroll and accounts payable checks, Tuesday through Saturday.

b) Business Requirements

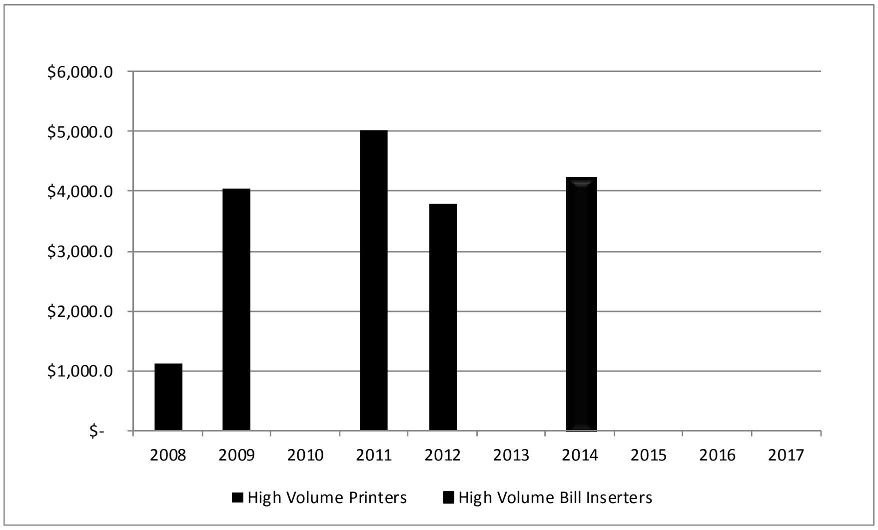
The high volume printers and inserters are pivotal tools used in SCE's billing process. SCE has a customer base of 4.9 million, of which 82 percent[74] receive their printed SCE electric bills via the United States Postal Service. SCE prints, inserts, and mails 224,000 customer bills and letters per day as of year-end 2012, in addition to checks to vendors, for a grand total of 179 million pages per year. To process this high volume of customer bills, letters, and checks, we will need to refresh printers and inserters which have reached their end of life. These older devices are highly mechanical and contain many moving parts which are subject to wear and tear. Printing, inserting, and mailing our customer bills, notices, payments, payroll, and other correspondence in a timely manner is essential to our business, and properly functioning equipment is key to our ability to perform this function consistently.

c) Recorded and Forecast Expenditures

SCE recorded $13.964 million for the period 2008-2012 to refresh high volume printers and bill inserters, and forecasts expenditures of $4.238 million, a 70 percent decrease, for the period 2013-2017, as depicted in Figure III-16 below.

[74] As of January 31, 2013.

Figure III-16
High Volume Printers and Bill Inserters
2008 to 2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded Costs (2015 case)					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
High Volume Printers	$ 1,115.6	$ 4,037.9	$0.0	$ 5,024.4	$ 3,786.2	$0.0	$0.0	$0.0	$0.0	$0.0
High Volume Bill Inserters	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$ 4,237.5	$0.0	$0.0	$0.0
Total	**$ 1,115.6**	**$ 4,037.9**	**$0.0**	**$ 5,024.4**	**$ 3,786.2**	**$0.0**	**$ 4,237.5**	**$0.0**	**$0.0**	**$0.0**

(1) Recorded Expenditures

In 2008 we spent $1.116 million because the high volume printers and high volume bill inserters were at the end of their useful life.

In 2009 we spent $4.040 million for two bill inserters to replace aging inserters in Rosemead and at the Irvine Data Center. Aging and obsolete mail inserters were replaced at the end of useful life.

In 2010 there were no expenditures because the high volume printers and high volume bill inserters had remaining useful life.

In 2011 we spent $5.024 million to refresh high volume printers at the end of their useful life.

In 2012 we spent $3.786 million – 2.214 million was to refresh high volume printers at the end of their useful life, and $1.571 million was to refresh bill inserters at the end of useful life.

(2) **Forecast Expenditures**

To develop reasonable high volume printer and bill inserter refresh forecasts, we identified the printers and bill inserters to be refreshed in the forecast period. We used the May 2012 quotes obtained from our strategic business partners, InfoPrint (high volume printers) and Pitney Bowes (high volume inserters) for pricing. InfoPrint and Pitney Bowes were selected as strategic business partners after responding to and winning competitive Request For Proposals (RFP) for providing printing and bill inserting solutions. These companies provide solutions meeting our business requirements.

In 2013 there are no planned expenditures because the high volume printers and high volume bill inserters will have remaining useful life.

In 2014 we estimate $4.238 million to refresh high volume printers and billing inserters.[75] In 2015, 2016, and 2017, there will be no expenditures because the high volume printers and high volume bill inserters will have remaining useful life which will extend beyond this GRC forecast cycle.[76]

d) **Conclusion**

For 2014 we estimate $4.238 million to refresh aging high volume printer and bill inserter hardware at the end of useful life. This will allow SCE to continue the critical operational activities of printing, inserting, and mailing our customer bills, notices, payments, payroll and other correspondence in a timely manner.

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[75] *See* Confidential workpaper entitled “Forecast Expenditures for High Volume Printers and Bill Inserters Refresh.”

[76] *See* workpaper entitled “Forecast Expenditures for High Volume Printers and Bill Inserters Refresh.”

6. Personal Computers (PCs) – Desktop/Notebook and Ruggedized Laptops Refresh

Table III-18
PC and Related Hardware Expenditures

WBS ID	Description
CIT-00-OP-SM-000001	PC's - CDE
CIT-00-OP-SM-000003	Ruggedized Laptops for CSBU
CIT-00-OP-SM-000005	TDBU Refresh for Ruggedized Laptops
CIT-00-OP-SM-000006	Specialty Printers for TDBU
CIT-00-OP-SM-000004	TDBU New Ruggedized Laptops
CIT-00-OP-SM-000009	Ruggedized Panasonics for field data collection

a) Background

SCE's Information Technology Operating Unit (IT) is responsible for procuring, deploying, and maintaining personal computers (PCs) for all employees at SCE who require one, both in an office environment and in a field environment.

Office workers are provided with PCs to carry out routine tasks including email, timesheets, word processing, budgeting activities, and the use of business related applications. Employees whose job requires them to support multiple locations or work remotely after hours are provided a standard laptop and all other employees receive a desktop PC and monitor.[77] The harsh field environment for troublemen responsible for responding to distribution and transmission line issues requires the use of a ruggedized laptop, which was introduced in 2001. Advances in technology and improvements in business processes have enabled current electronic information to replace potentially outdated paper versions for work in the field. During the years 2002 – 2003, the ruggedized laptop deployment was expanded to include Transmission Patrolmen, Substation Technicians, Field Service Representatives, and Meter Technicians. Devices have been maintained and refreshed to these positions since then.[78]

[77] *See* workpaper entitled “IT Policy on laptop vs desktop justification.”

[78] *See* workpaper entitled “Growth of laptop use over desktop use.”

b) Business Requirements

(1) Office Environment

With advances in technology, PCs have become more powerful and more reliable, giving us the ability to extend their useful life. Their greater power has enabled increased business capability with applications such as mapping, outage management, and engineering design and modeling. Refresh of PCs is primarily driven by age and technology obsolescence. PCs durability and capabilities have increased year over year allowing us to expand their useful life one additional year going forward.[79] With the improved reliability and longer use life, desktop PCs will now be refreshed every five years, laptop PCs every four years,[80] and monitors every seven years, affording us the ability to extend the useful life of these devices provided we can obtain spare parts.

Mobile and remote workforce requirements have increased over the years, driving our current PC environment to 60 percent laptop and 40 percent desktop.

(2) Field Environment

Business in the field requires current electronic versions of circuit maps, safety manuals, and work management information to replace outdated paper versions. Electronic files allow SCE to provide field employees with the most current versions of documentation needed by them, while also providing a more efficient means to house and retrieve the types of vast documentation that employees may need to reference in the field at any given time (for up to date safety procedures, troubleshooting, etc.) Additionally, through the advancement of technologies and the introduction of electronic forms for submissions, new work processes have been established that take advantage of these mobile capabilities. Ruggedized laptops are securely mounted in field trucks, and accompanying mobile specialty printers enable printing of customer receipts and circuit maps. The harsh field environment includes travel over rough terrain and in inclement weather. Ruggedized laptops are built to operate under these extreme conditions. The devices have magnesium alloy cases, are sealed against water, and have shock-mounted hard drives. Cellular modems provide wireless connectivity for work dispatch, and global positioning system receivers enable street mapping software so that crews can locate work sites.

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[79] *See* workpaper entitled "Refresh plan of 4 year cycle at 25% per year" for recorded and forecast costs.

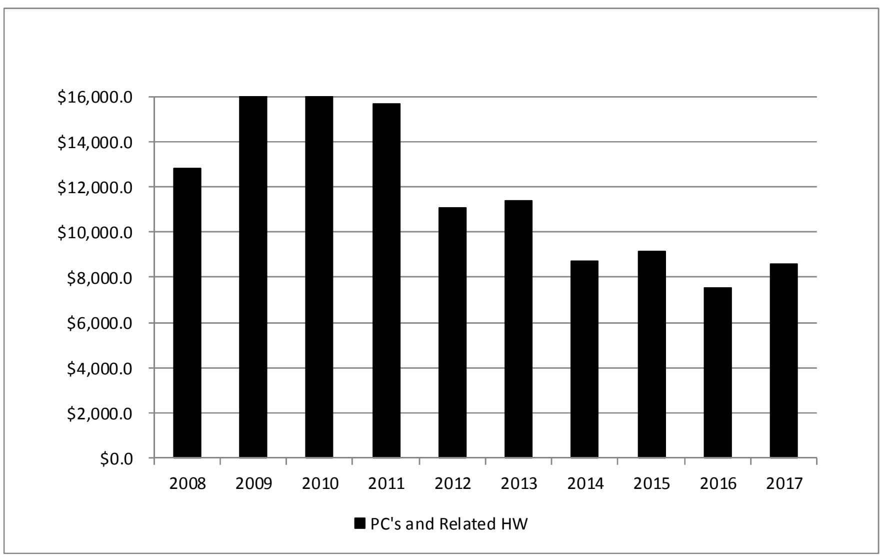
[80] *See* workpaper entitled "PC Purchase Lifecycle" for older industry standard PC refresh cycles.

Just as with the office environment PCs, one of the top drivers for the refresh of Ruggedized laptops is end-of-life, which is addressed on a three-year plan to match the industry standard of model releases.[81]

c) **Recorded and Forecast Expenditures**

SCE recorded $78.204 million for the period 2008-2012 to refresh PCs and estimates a total of $45.326 million, a 42 percent decrease, for the period 2013-2017 as depicted in Figure III-17 below.

Figure III-17
PC's and Related Hardware Expenditures
Recorded 2008-2012 and Forecast 2013-2017
(Nominal $000)

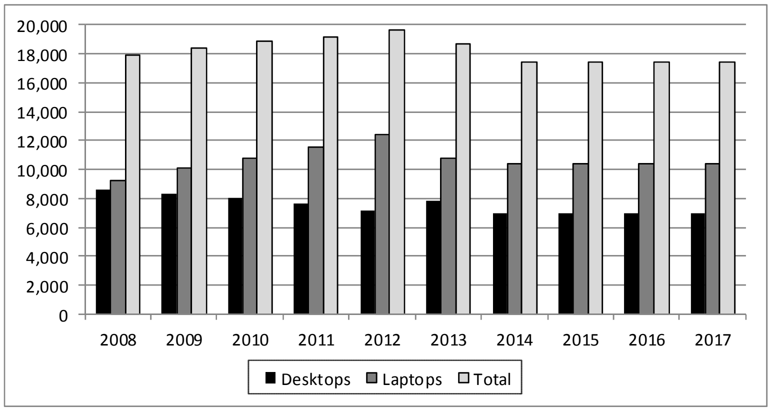


	Recorded					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PC's and Related HW	$12,787.2	$21,323.4	$17,344.3	$15,671.7	$11,077.1	$11,350.0	$8,724.6	$9,128.0	$7,559.0	$8,564.0
Total	**$12,787.2**	**$21,323.4**	**$17,344.3**	**$15,671.7**	**$11,077.1**	**$11,350.0**	**$8,724.6**	**$9,128.0**	**$7,559.0**	**$8,564.0**

Figure III-18 below shows the data for standard office PCs in use broken out by desktop and laptop for the recorded period (2008-2012) and forecast period (2013-2017). The forecast device counts align with the overall projected employee base for the forecast period.

[81] *See* workpaper entitled "3 year refresh on Ruggedized laptops" for the product lifecyle suggested by Panasonic, the manufacturer of SCE's standard approved ruggedized laptops.

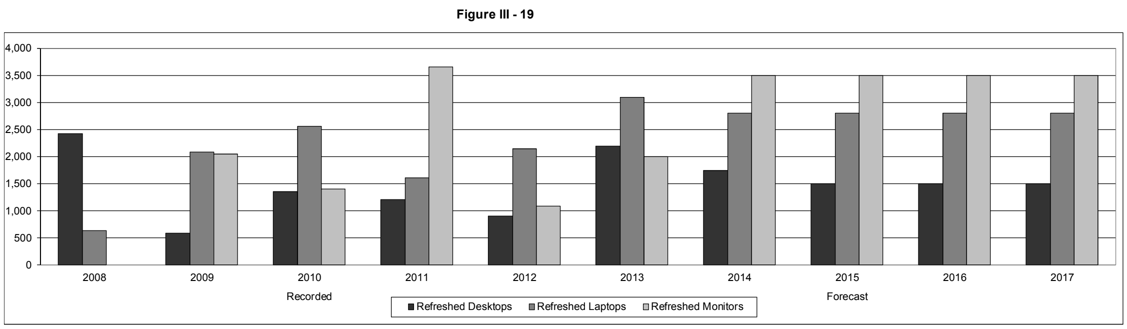
Figure III-18
Desktop and Laptops in use
Recorded 2008-2012 and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Desktops	8,663	8,341	8,030	7,610	7,200	7,835	7,000	7,000	7,000	7,000
Laptops	9,283	10,070	10,800	11,600	12,400	10,800	10,400	10,400	10,400	10,400
Total	17,946	18,411	18,830	19,210	19,600	18,635	17,400	17,400	17,400	17,400

Figure III-19 below shows the refresh units needed for desktops, laptops, and monitors for the recorded period (2008-2012) and forecast period (2013-2017).

Figure III-19
PCs Refresh Units
2008-2012 Recorded and Forecast 2013-2017



	Recorded					Forecast				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Refreshed Desktops	2,432	586	1,353	1,205	901	2,200	1,750	1,500	1,500	1,500
Refreshed Laptops	640	2,091	2,557	1,615	2,145	3,100	2,800	2,800	2,800	2,800
Refreshed Monitors	0	2,050	1,409	3,653	1,089	2,000	3,500	3,500	3,500	3,500

Recorded 2012 Refresh activity was lower then forecast due to application readiness delays for the Windows 7 migration. This resulted in a roll over to the 2013 numbers

Life cycle changes are reflected in the Years 2013-2017. Laptop will now have a 4 year, desktops a 5 year and monitors a 7 year life cycle

(1) Recorded Expenditures

In 2010-2012 mobile and remote workforce requirements increased slightly, resulting in more conversions of desktop users to laptops. Growth in hiring and a growing need for additional mobility within our workforce resulted in a consistent shift year over year of laptop versus desktop need as well, driving our current PC environment to 60 percent laptop and 40 percent desktop.

In 2012, the trend towards conversions to laptops has leveled off and our current PC environment is 60 percent laptop and 40 percent desktop. In 2012 we acquired approximately $503,000 in hardware to refresh the Energy Management System (EMS) group. This included 126 workstations, 348 monitors and 36 printers for this group.

(2) Forecast Expenditures

Forecasts for 2013-2017 reflect a refresh of approximately 20 to 25 percent of our PC inventory each year. Also included is the refresh of monitors, which have an average life of seven years.

During the period 2013-2017, the price of PCs is expected to hold steady at the newly negotiated rates from our PC provider. A new lower rate was negotiated and implemented in 2012. To develop reasonable PC forecasts, we determined the amount of PCs that need to be refreshed by year within the forecast period and estimated cost from quotes from our PC provider.[82] To ensure costs remain competitive, SCE conducted a competitive PC Product & Services Request For Proposal (RFP) where we chose Dell,[83] renegotiated pricing with them, and set up quarterly reviews of their pricing with their competitors. Costs remain steady as we take advantage of new capabilities and advancements in technology in new products as they replace older models to increase efficiency and productivity for our employees.

(3) Ruggedized Laptops

Figure III-20 below shows the recorded and forecast expenditures for ruggedized laptops.

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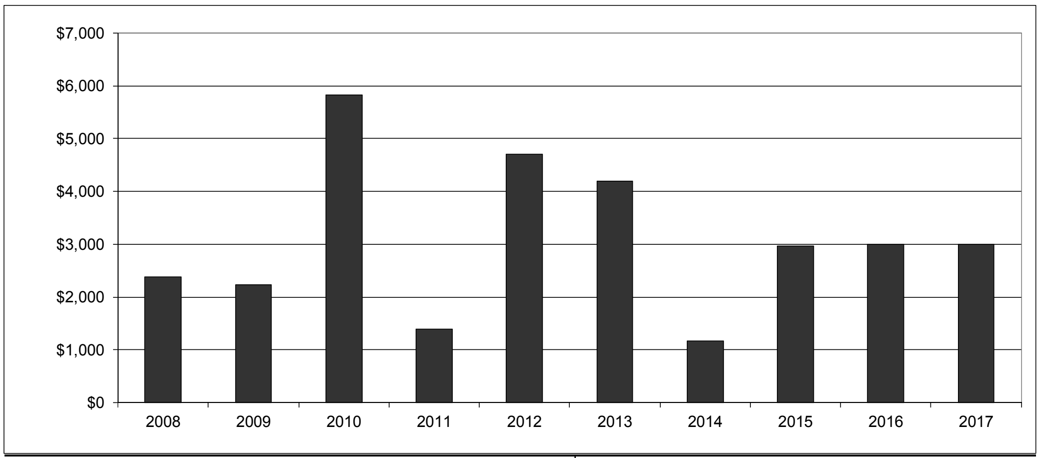
82 *See* workpaper entitled "Cost chart of current devices."

83 *See* workpaper entitled "Dell White Papers - Our PC Model Standards" for more information on SCE's selected PC models.

Figure III-20
Ruggedized Laptops Budget Requirement
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)

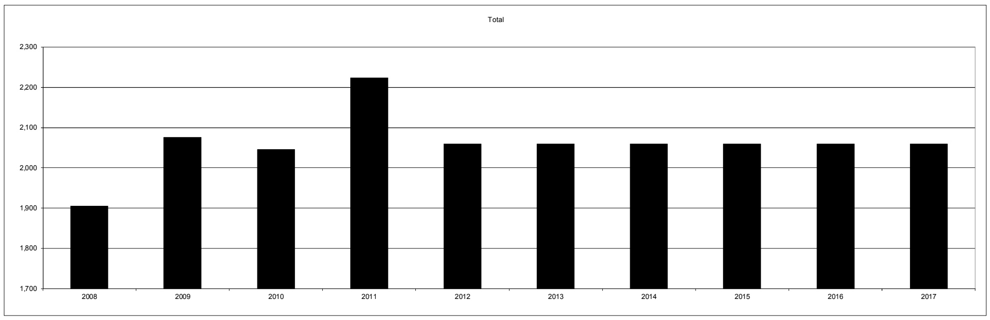


	Recorded					Forecast				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Amount ($000)	$2,389	$2,240	$5,825	$1,400	$4,703	$4,200	$1,168	$2,968	$3,000	$3,000

(a) Recorded Cost Analysis 2008-2012

The number of ruggedized laptops in service expanded from 1630 in 2005 to 2076 by end of 2012 as we added field force positions within the Transmission Distribution Operating Unit (T&D) that utilize technology in the field (e.g., e-crew foreman, overhead and underground inspectors, senior patrolmen, apparatus technicians, substation maintenance electricians/technicians, etc.). Mobile applications provide the field information required by these field force positions to help restore electrical service and improve customer service.

Figure III-21
Total Number of Ruggedized Laptops In Use
2008-2009 Recorded and Forecast 2013-2017



	Recorded					Forecast				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	1,905	2,076	2,046	2,223	2,060	2,060	2,060	2,060	2,060	2,060

(b) Forecast Costs Analysis 2013-2017

To develop reasonable forecasts for the ruggedized laptop refresh we determined the projected business needs of the organization and analyzed our current inventory. To ensure costs remain competitive, SCE conducted a competitive PC Product & Services Request For Proposal (RFP), negotiated pricing with the vendor, and set up quarterly reviews of their pricing with their competitors. Costs remain steady as we take advantage of new capabilities and technology advancement in new products as they replace older models to increase efficiency and productivity for our employees. Our selected PC provider is a Diverse Business Enterprise (DBE) supplier, which serves to fulfill SCE's supplier diversity requirements as established in the CPUC General Order 156.[84]

Ruggedized devices deployed during the 2012-2014 period for T&D and the Customer Service Operating Unit will pass their third year of service during the forecast period 2015-2017, and during that time additional field staff will begin utilizing mobile technology in the field. We expect that the current ruggedized laptops will need to be refreshed.

Standardization of desktops and laptops for the office environment and ruggedized laptops for the field brings improved information sharing, computing stability and

[84] DBE is defined as a business that is at least 51% woman, minority, or severice-disabled veteran owned; or in the case of any publicly owned business, at least 51% of the stock of which is owned by one or more woman, minority, or service-disabled veteran groups, and whose management and daily business operations are controlled by one or more such groups. The woman, minority, or service-disabled veteran groups owning such an enterprise must be either U.S. citizens or legal aliens with permanent residence status in the United States.

employee productivity. It also establishes a predictable PC environment that is easier to support and allows for a routine refresh process. Without standardization and a continued refresh of the PC environment, SCE would experience higher maintenance costs for PCs and related hardware, difficulty maintaining service levels to our customers, and the inability of the PCs to support advances in technology.

PC manufacturers generally operate on a production cycle of 12-18 months due to changing technology. Ruggedized laptops are generally on a longer time frame of 18-24 months due to specialized engineering and design requirements.

We currently purchase all of our PCs with a three-year parts and labor service contract. If they break after the three years we pay time-and-material prices to have them repaired. These repairs are costly and become more frequent as the PCs age. In order to optimize our spend and use of PCs, we manage a five-year refresh program for desktop PCs and a three-year refresh program for our laptops. Based on our experience and industry best practices, we believe this to be an adequate and effective refresh cycle.[85]

d) Conclusion

The use of PCs in both the office environment and in the field continues to expand. Applications continue to demand faster processors and larger storage. Downtime due to PC failure is costly to productivity and ultimately inhibits our ability to adequately serve SCE's customers. Therefore, a reasonable refresh program that replaces most PCs before they break is preferable to one that waits until failure. We believe that we have such a program and that it is a necessary part of providing safe and reliable service.

7. Data and Voice Network Replacements

Table III-19
Data and Voice Network Replacements
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-NS-000007	Data and Voice Network Replacement
CIT-00-OP-NS-000185	CRE Pomona Innovation Way

[85] *See* workpaper entitled "PC Purchase Lifecyles" for older industry standard refresh cycles.

a) Background

Data and voice network replacement provides for ongoing replacements and upgrades of telephone systems and data network equipment as required due to technology and operational obsolescence.

b) Business Requirements

Because of continually increasing security requirements,[86] it is necessary to continue to refresh the data and voice infrastructure in order to stay up with technology and avoid operational obsolescence.[87] By deploying newer technologies with additional functionality we are able to meet the requirements of critical Operating Unit projects and long term business objectives. It becomes increasingly difficult to maintain and manage maintenance and support as equipment used by our data and voice network ages.

c) Recorded and Forecast Expenditures

SCE recorded $59.398 million for the period 2008-2012 for data and voice network replacement, and forecasts $73.500 million, a 24 percent increase, for the period 2013-2017 as depicted in Figure III-22 below.

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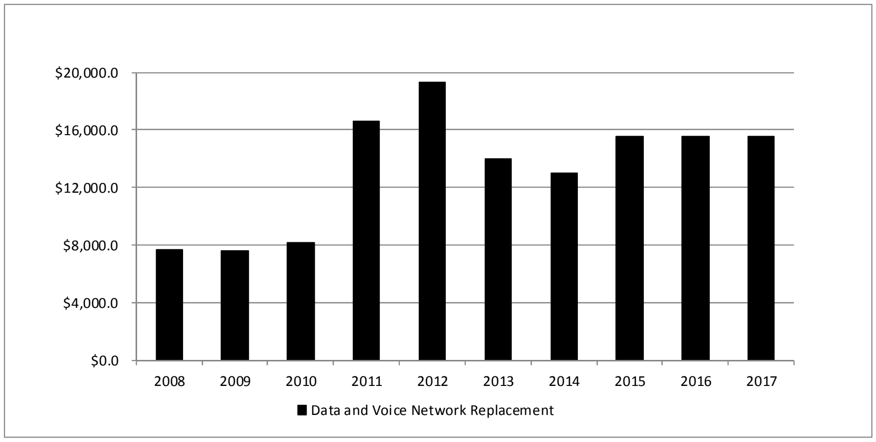
[86] *See* “The Continuing Challenge of Cybersecurity,” Chapter I, Section C, of this Volume for further discussion.

[87] Operational obsolescence is the term used to describe equipment that cannot meet the requirements of the current operating environment.

Figure III-22
Data and Voice Network Replacement Expenditures
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (case)				
	2008	**2009**	**2010**	**2011**	**2012**	2013	2014	2015	2016	2017
Data and Voice Network Replacement	$7,663.5	$7,626.0	$8,165.6	$16,644.5	$19,298.2	$14,000.0	$13,000.0	$15,500.0	$15,500.0	$15,500.0
Total	**$7,663.5**	**$7,626.0**	**$8,165.6**	**$16,644.5**	**$19,298.2**	**$14,000.0**	**$13,000.0**	**$15,500.0**	**$15,500.0**	**$15,500.0**

(1) Recorded Expenditures

Our spending for data and voice network replacements varied during the 2008-2012 period. Our average spending targets during that period would have been approximately $11.9 million in an average year, replacing about 400 data networking devices and 2,000 telephone lines, as well as providing data network upgrades at data centers that support the operation of our entire data network. The 2011 recorded costs reflect about $5 million more than in an average year due to refreshing and upgrading critical infrastructure in the two data centers. In 2012 we initiated several refresh projects to replace outdated equipment to support security projects and replace equipment that is unsupported by the vendor, which accounted for about $8 million of additional capital expenditure.

(2) Forecast Expenditures

To develop reasonable forecasts for data and voice network replacement we used estimates developed from recorded costs for the same or similar work.[88] Our strategic partners for data and voice network replacements are selected based on their ability to provide a unique product

[88] *See* workpaper entitled "Forecast Expenditures for Voice and Data Network Replacements."

or service that is either technically or operationally required to support the technologies we deploy. Where multiple vendors can provide the same product or service, we select vendors through a competitive bidding process. These vendors are regularly re-evaluated prior to contract renewal to determine if they still provide the most cost effective solution.

In 2013 we forecast $14.000 million and in 2014 $13.000 million on data network and telephone equipment replacements. These amounts include $4 million each year for management tools, wireless devices, and security devices for our common data hubs that support the entire network. This spend will address equipment that has reached the end of its five year lifecycle. This lifecycle is based on industry standards from Gartner.[89] We also estimate $1 million in this category in 2013 to support the upgrade to VOIP licenses from the obsolete PBX system, and the related infrastructure refresh.

In 2015-2017, we estimate $5.500 million for telephone replacements and $10.0 million each year for data network replacements including tools for security and network management, NERC/CIP security requirements, and increased network traffic. For example, we have seen an increase of over 100 additional networking devices introduced each year into our network due to new electrical facilities or building remodels. We have also seen about a 30 percent increase in data network traffic over the last eighteen months. The budget for data and voice network replacement also covers the lifecycle replacement of equipment (such as routers, switches, and transmission gear) installed in connection with other projects such as Pomona Innovation and General Office 5 development, as well as several other new buildings completed in 2010-2011. The initial installation costs for this equipment were covered under the budgets for those projects; however the lifecycle replacement would be a requirement for the data and voice network replacements budget. The additional lifecycle replacement for these other projects account for $2.5 million of our requested increase.

d) Conclusion

The data and voice networks are integral to our ongoing business. SCE uses the telephone system for communications within and between various SCE facilities. The data network supports essential functions at substations, service centers, generating stations, and business offices, as well as communication via the Internet with customers and outside organizations. In order to maintain a

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[89] *See* workpaper entitled "Network Equipment Lifecyle, Mark Sabbi, Gartner."

reliable communication network, data and voice network replacement provides for ongoing replacements and upgrades to the data network equipment and telephone systems as required due to technical and operational obsolescence. With the exception of large projects required by the Operating Units, we estimate on average about $15.5 million per year from 2015-2017 to provide upgrades to the data network and telephone systems for the entire network, including network management and network security devices. This is a 24 percent increase from previous years 2008 through 2012. Data and voice network replacement will replace obsolete equipment, address the growth and new security requirements in data network equipment, and accommodate data network traffic growth required to support the continually increasing network demands throughout the company.

8. Transmission Network & Facilities

Table III-20
Transmission Network Facilities
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-NS-000008	Transmission Network and Facilities
CIT-00-OP-NS-000010	Netwcomm Radios for CSBU Metering

a) Background

The Transmission Network and Facilities budget item provides for the life-cycle replacement of obsolete, failed, and damaged telecommunications network equipment. The telecommunications transmission network is the backbone on which the data and voice network runs. This network consists of the infrastructure layer (fiber optic cable, microwave, etc.) and the transport layer (fiber optic equipment and terminals). This is distinct from the data and voice network systems described in Chapter III, Section A. 7 of this volume, which consists of routers, switches, telephone systems, among other components. The expenditures support three types of work: telecommunications facilities upgrades, network equipment replacement, and storm mitigation.

SCE operates and maintains a communications network that includes over 4,400 miles of fiber optic cable, 300 satellite terminals, and 47,000 NetComm radios. This network is used for communications among our employees to dispatch personnel for restoration of electric service and new service activation. The network is also used to support operations and maintenance of the electric grid, as well as to interact with customers and vendors. The Transmission Network and Facilities budget item is for replacing aging portions of SCE's telecommunications network equipment and systems, accommodating growth, and providing for replacement of damaged or failed equipment such as those damaged by storms.

b) Business Requirements

The network element of this budget item is dedicated to the addition or replacement of communications network transmission equipment (e.g., fiber optic equipment, satellite terminals, and NetComm radios). Network additions are necessary when the communications traffic along a given segment of the network grows to the point that the existing equipment is unable to handle it effectively, much like a congested freeway. The inability to accommodate communications traffic is recognized by assessing reports of delays in computer transactions and identifying communications links that are being fully utilized and cannot accommodate any further traffic growth. On an ongoing basis we evaluate how much of the network capacity is being used on various communications links. The available capacity is then compared to additional planned capacity requirements from new projects or business unit requests, and these additional requirements are factored into the life-cycle replacement of equipment.[90] Network replacements are also necessary when equipment has failed or aged to the point that it has become obsolete and we can no longer acquire parts or support for the systems from the manufacturer or vendor.[91] Network maintenance, telecommunications facilities upgrades, and storm mitigation are the three primary areas of expense for the network element of this budget item.

The purpose of the telecommunications facilities element is to maintain the overall reliability of SCE's telecommunications network by making appropriate additions and replacements to communications facilities. Our communication sites are equipped with battery back-up and standby generators to enable constant communications availability in the event of an electrical power outage at the site. However, as direct current power systems age, the batteries can no longer hold sufficient electrical charge to serve as a reliable back-up and must be replaced. We inspect these systems annually and determine which systems need to be replaced based on their condition at the time they are inspected.

Another aspect of the telecommunication facilities element of this budget item is funding for replacement of roofing systems and air conditioning equipment at our communications

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90 *See* A.10-11-015, SCE's 2012 GRC, SCE-05, Vol. 2, Transmission Network & Facilities.

91 *See* workpaper entitled "Network Equipment Lifecyle, Mark Sabbi, Gartner."

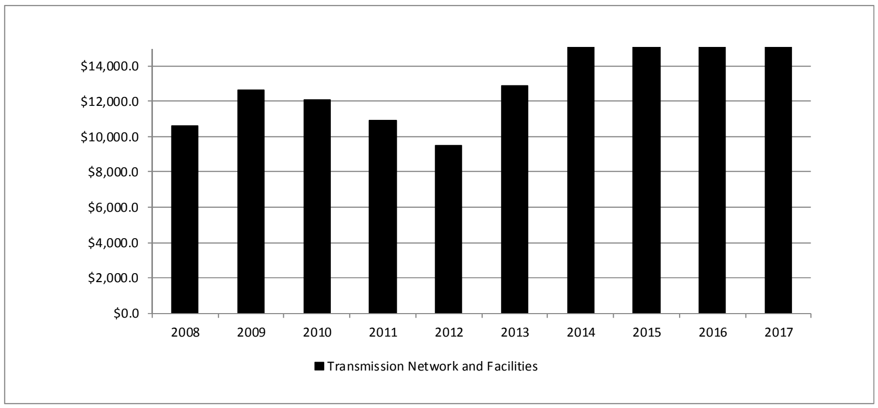
facilities. Communications equipment operates best in an environment of low humidity and moderate temperature. Because communications equipment generates heat during normal operations, when telecommunications equipment is added at a location, additional air conditioning capacity is typically needed to keep the temperature within an acceptable range so that the equipment can operate. Over time, leaks can develop in the roofs of the facilities that house this equipment, and air conditioning systems break down with increasing frequency. As the maintenance costs to repair roofs and air conditioning systems rise, and the risk of exposing sensitive equipment to the elements increases, the roofs and air conditioning units eventually must be replaced. The decision to replace rather than repair is made when repairs are not possible because the damage is too extensive or when parts are not available for repairs.

The storm mitigation element of this budget item is for the repair or replacement of damaged equipment and restoration of communications critical to SCE operations caused by storms and the elements. Incidents of snow, ice, lightening, high winds, and power surges, as well as the cumulative impact of these forces over time, can damage, degrade, or destroy telecommunications facilities and equipment. Equipment such as communications antennas and fiber optic cables that are located outdoors are particularly susceptible to damage from the elements. Once the equipment has been damaged, it must be replaced in order to maintain the communications network.

c) Recorded and Forecast Expenditures

SCE recorded $ $55.798 million in expenditures during 2008-2012 for the Transmission Network and Facilities, and estimates $ $82,562 million, a 48 percent increase, for 2013-2017, as depicted in Figure III-23 below.

Figure III-23
Transmission Network and Facilities Expenditures
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Transmission Network and Facilities	$10,639.0	$12,607.3	$12,111.4	$10,934.4	$9,506.1	$12,100.0	$14,500.0	$17,300.0	$17,300.0	$17,300.0
Netcomm Radios for CSBU Metering						$754.0	$800.0	$807.0	$836.0	$865.0
Transmission Network and Facilities	$10,639.0	$12,607.3	$12,111.4	$10,934.4	$9,506.1	$12,854.0	$15,300.0	$18,107.0	$18,136.0	$18,165.0

(1) Recorded Expenditures

Our spending for Transmission Network and Facilities budget item matters varied during the 2008-2012 period. Our spending target during that period would have been approximately $6.2 million per year. The 2008 and 2009 expenditures were not average spending years due to replacement of critical obsolete microwave equipment as well as the completion of the mobile radio system upgrade.[92] The 2010-2012 expenditures were more than typical years with increases to support increased network capacity to our data network hubs that support all the users of SCE's data network.

(2) Forecast Expenditures

During 2013-2017 we forecast a total of $82.562 million for Transmission Network & Facilities budget item costs. We used information developed from our recorded costs for the same or similar work to formulate our forecast estimates.[93] Our vendors for Transmission Network and Facilities are selected based on their ability to provide a unique product or service that is either

[92] *See* Chapter III, Section A.12 of this volume for the full discussion on Mobile Radio System Upgrade.

technically or operationally required to support the technologies we deploy. Where multiple vendors can provide the same product or service, we select vendors through a competitive bidding process. These vendors are regularly re-evaluated prior to contract renewal to ensure they still provide the most cost effective solution.

During 2013-2017 we estimate a total of $82.562 million, which is a 48 percent increase over the period 2008-2012. In 2013 and 2014, we estimate $12.854 million and $15.300 million, respectively. Included in 2013 are $1.900 million for storm mitigation, backup power systems, and facility repairs, and $ $10.954 million for telecommunications network equipment replacement. The telecommunication network equipment replacement includes expenditures for fiber optic equipment, satellite terminals, network synchronization equipment, and NetComm radios used to support selected electric meters for our Customer Service Operating Unit.

In the three year period 2015-2017, we estimate $18.107 million, $18.136 million, and $18.165 million, respectively. The continued level of annual spending addresses the continued increase in network equipment and traffic growth. For example, we have seen the data traffic through our network increase about 275 percent over the last three years. Accordingly, in the 2015-2017 period we estimate $3.100 million for storm mitigation, backup power systems, and facility repairs, and $15.100 million for telecommunications network equipment replacement. The actual expenditures in the above categories and equipment types will vary from year to year because this budget item covers failed and damaged telecommunications network equipment. For any given year, the type of equipment that fails will vary depending on the circumstances. Also, because storms and emergency facility repairs are considered unforeseen events and difficult to forecast, SCE reserves approximately two percent of this budget item to ensure availability of funds should such events occur.

Also during 2013-2017, we estimate capital funding to replace the aging NetComm radios used for the Customer Service Operational Unit's remote metering. The average cost per year is approximately $812,000 for a total five year forecast of $4.062 million.

d) Conclusion

SCE's extensive telecommunications network is used for communications among our employees, for the dispatch of personnel for restoration of electric service and new service

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Continued from the previous page

93 *See* workpaper entitled "Forecast Expenditures for Transmission and Facilities."

activation, to support operations and maintenance of the electric grid, and to support interaction with customers and vendors. The Transmission Network and Facilities budget item funds are used to replace aging portions of SCE's telecommunications network equipment and systems, accommodate growth, and provide for replacement of damaged or failed equipment such as that damaged by storms. This budget item will support three major initiatives: telecommunications facilities upgrades, network equipment replacement, and storm mitigation. The telecommunications facilities element maintains the overall reliability of SCE's telecommunications network by making appropriate additions and replacements to communications facilities and back-up power systems. The facilities portion of this budget item funds the replacement of roofing and air conditioning equipment at our communications facilities, among other activities, to ensure that the facilities operate properly. Finally, the network element of this budget item is dedicated to the addition or replacement of communications network transmission equipment to maintain reliable network operations and reduce communications traffic congestion.

9. Copper Wire Replacement

Table III-21
Copper Wire Replacement
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-NS-000011	Copper Wire Replacement

a) Background

The Copper Wire Replacement budget item funds the replacement of aging copper communication cable with fiber optic cable necessary to preserve the reliability of grid protection and grid operations circuits, provide increased bandwidth, and reduce maintenance costs.

SCE uses a variety of communications technologies in its telecommunications network, including fiber optic cable, copper cable, and microwave. The microwave and fiber optic systems cover our larger business offices as well as about 100 of our larger Transmission and Distribution substations. When we started the Copper Wire Replacement project in 1997, we had 2,000 miles of copper communications cable supporting protective relaying, power management, and other grid operations and control circuits for the operation of approximately 500 Transmission and Distribution substations throughout SCE's 50,000 square mile service territory. These grid protection circuits require real-time, highly reliable communications channels for proper operation. This project will extend fiber optic communications to these 500 substations and replace all 2,000 miles of copper cable by 2020, which represents a 24-year effort from the project's initial start in 1997.

Through 2012, we had completed installation of 1,098 miles of fiber optic cable and fiber optic terminal installation at 375 substations. Over the next five years, we will continue to install fiber optic cable to support the remaining substations. This long-term effort to install new fiber optic cable to replace this aging copper cable infrastructure will be completed by the end of 2020. If we slow the pace of replacement, we run the risk that problems with the aging copper cable will arise faster than we can respond to them because of the amount of time needed to replace cable. This would adversely impact key communications required for the operations and support of the electric grid. The copper cable removal effort lags behind the fiber cable installation because all circuits and equipment on a copper cable network ring must be cutover to the fiber cable prior to removing the copper cable. Thus, we will continue the effort to remove the copper cable through 2020.[94]

b) Business Requirements

The average service life of this type of copper cable ranges from 25 to 35 years, depending on the environment where the cable is installed. Most of SCE's copper cable is more than 25 years-old, with over 50 percent (more than 1,000 miles of cable) more than 35 years-old.[95] As copper cable reaches the end of its useful life, performance degrades as a result of ground faults, susceptibility to noise, and the effects of hi-voltage testing and cable outages. All of these factors reduce reliability. Moreover, regardless of age, copper cable is susceptible to Ground Potential Rise (GPR) problems inherent in copper communications cable operating near energized power lines.[96] The fiber-optic cable that SCE is using to replace the aging copper cable is not susceptible to the same degree of degradation and reliability problems.

In addition, copper cable does not support necessary bandwidth capacity needs. Additional bandwidth is required to support T&D automation projects, such as Substation Automation and Substation Data Collection. Copper cable cannot effectively handle the added bandwidth

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94 *See* workpaper entitled "Copper Cable Replacement Cumulative Recorded and Forecast Expenditures."

95 *See* workpaper entitled "Aging Copper Wire and Protective Relaying Replacement Strategy."

96 Ground Potential Rise is an electrical-magnetic interference that occurs when copper cables are in close proximity to high-voltage electrical lines, and the electrical lines experience a voltage spike. Because copper cables are used to communicate with T&D substations, they terminate at these substations and are strung along the same rights of way that

(*Continued*)

requirements such as those are attributable to automation systems that require faster transmission of data between substations and allow T&D to operate and gather information from unattended substations.

Given the advantages of fiber optic cable over copper cable, in 1996, SCE undertook this program to replace our existing copper cables with fiber optic cables. Before deciding on this alternative, however, we evaluated four options to address the problem of aging copper communications cable. The four options considered were:

- Retain the status quo.
- Replace copper cable with copper.
- Lease circuits from telecommunications companies.
- Install fiber optic cable.

The results of that analysis showed that the fourth option of replacing copper cable with fiber option was the optimal choice.[97] This outcome was re-analyzed and confirmed in 2001, and still holds true today. We have not performed an updated analysis since the technologies involved have not changed since 2001. Replacing all our copper-based circuits with fiber optic cable mitigates the effects of deteriorating copper cable, preserves the reliability of our grid operations circuits, and provides increased bandwidth for future growth for T&D projects. In addition, because fiber optic cables are made of glass and transmit signals with light rather than electrical current, the Ground Potential Rise interference problem discussed above will be eliminated.

c) Recorded and Forecast Expenditures

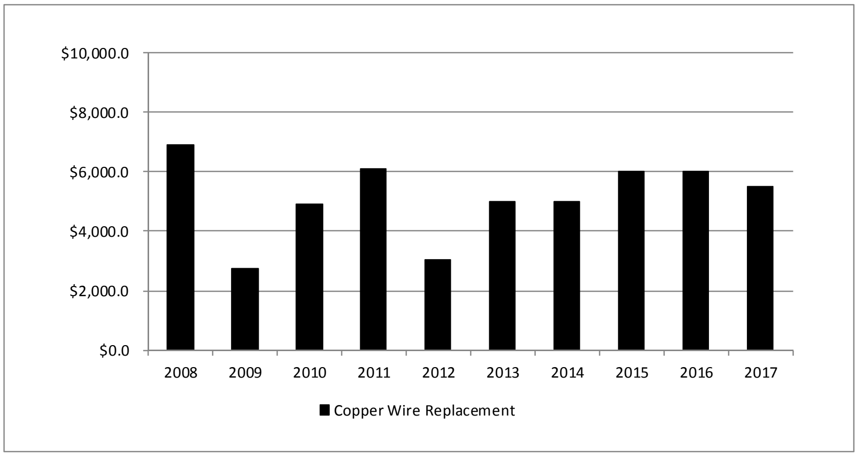
SCE recorded $23.674 million for the period 2008-2012 for Copper Wire Replacement, and estimates $27.500 million, a 16.2 percent increase, for the period 2013-2017 as depicted in Figure III-24 below.

Continued from the previous page

are used for power lines. When communications were first extended to substations decades ago, copper cable routed via our rights of way was the only viable means.

[97] *See* workpaper entitled "Aging Copper Wire and Protective Relaying Replacement Strategy."

Figure III-24
Copper Wire Replacement Expenditures
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded (2015 case)					Forecast (2015 case)				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Copper Wire Replacement	$6,894.6	$2,754.3	$4,917.9	$6,079.1	$3,028.4	$5,000.0	$5,000.0	$6,000.0	$6,000.0	$5,500.0
Total	**$6,894.6**	**$2,754.3**	**$4,917.9**	**$6,079.1**	**$3,028.4**	**$5,000.0**	**$5,000.0**	**$6,000.0**	**$6,000.0**	**$5,500.0**

(1) Recorded Expenditures

We initiated preliminary engineering for the fiber optic cable alternative to copper wire in 1996, and we started substantial cable replacement activity in 1997. The replacement program has targeted our least reliable and most problematic copper cable systems first. From 1997 to 2001, we installed 236 miles of fiber optic cable and associated lightwave equipment for 53 substations. As we noted in the 2009 GRC testimony, we reassessed the replacement strategy in 2001. We found that the then-current pace of replacement would not support business data and reliability needs, and we began a more accelerated program to replace the remaining aging copper cable infrastructure. The replacement program would have taken 40 years to complete at the prior pace.

In 2002 we began the transition to the accelerated replacement program with $2.1 million in spending. From 2003 to 2006, we continued our gradual increase in spending ranging from $6.4 million to $10.3 million. The 2008 expenditures decreased by $4 million to accelerate the upgrade of our mobile radio system from the years in which this was funded – 2009 and 2010. In 2009 expenditures were $2.754 million due to an increase in the time required to obtain permits for cable construction, which slowed down our rate of installation. From inception through the end of 2012, we installed 1098 miles of fiber optic cable and associated lightwave equipment for 375 substations at a cost of $77.5 million – an average of about $70,583 per mile, including fiber optic terminal equipment. This cost includes the installation of fiber cable and fiber optic equipment only, as various systems continue to operate off existing copper wire systems.

(2) Forecast Expenditures

To develop a reasonable forecast for Copper Wire Replacement project cost we used estimates developed from recorded costs for the same similar work. Our vendors for the Copper Wire Replacement project are selected based on their ability to provide a unique product or service that is either technically or operationally required to support the technologies we deploy. Where multiple vendors can provide the same product or service, we select vendors through a competitive bidding process. These vendors are regularly re-evaluated prior to contract renewal to ensure they still provide the most cost effective solution.

Our plan for copper wire replacement in 2014 reflects our current outlook for planned maintenance activities and T&D's forecast of grid protection circuit requirements. We plan to install approximately 30 miles of fiber optic cable and associated equipment at 18 substations by the end of 2014. In a typical year, we expect to install about 30 miles of fiber optic cable and associated equipment at 20 substations. This rate will allow for completing replacements by 2020.

We estimate on average $5.5 million annually through 2017. Although costs vary significantly based on the areas where the fiber optic cable is being installed, proposed spending levels for 2015 and beyond are based on installing approximately 25 miles of fiber optic cable per year at a cost of $75,000 per mile, and installing equipment at over 24 substations each year at a cost of $100,000 per terminal.[98]

d) Conclusion

The Copper Wire Replacement budget item funds SCE's program to replace aging copper communication cable with fiber optic cable to preserve the reliability of grid protection and grid operations circuits and provide increased bandwidth for communications. Through its completion in 2020, this project will extend fiber optic communications to these 500 substations and replace all 2,000 miles of copper cable that existed in 1997.

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98 *See* workpaper entitled "Project Cost Estimate Summary- Copper Cable Replacement."

10. Fiber Cable Replacements

Table III-22
Fiber Cable Replacements
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-NS-000228	Fiber Optic Cable Replacement

a) Background

The Fiber Optic Cable Replacements budget item is a new item for this rate case. This budget item (created in 2010) provides for the replacement of aging or failing fiber optic cables. The budget item's scope includes the replacement of these long distance fiber optic cables, which are used primarily for long distance data transmission. The budget item's scope does not include the replacement of the associated network electronic equipment to which the cables connect. That equipment is addressed, depending upon use, in the Data and Voice Network Replacement program or in the Transmission Network & Facilities program described elsewhere in this volume.

SCE operates and maintains a communications network that includes over 4,400 miles of fiber optic cable. This network is used for communications among our employees for the dispatch of personnel, for restoration of electric service, for new service activation, to support operations and maintenance of the electric grid, and for interaction with customers and vendors.

b) Business Requirements

This budget item is dedicated to the replacement of aging, problematic fiber optic cables. Cable replacements are necessary when cables begin to fail, are aged to the point that they become problematic, or cannot effectively handle new fiber optic systems. For example, some of our cables – about 527 miles – cannot reliably handle the newer, higher speed fiber optic terminals that we are installing to meet increasing network capacity requirements or support new facilities (i.e., substations, business offices, etc.)[99] SCE began large-scale installation of fiber optic cable in the mid-1990's. By 2015, these cables will be over 20 years old. Because our fiber network provides some of our most critical communications connections to substations, customer call centers, data centers, and

[99] *See* workpaper entitled "Sumitomo Fiber Cable" for locations of SCE's fiber cable.

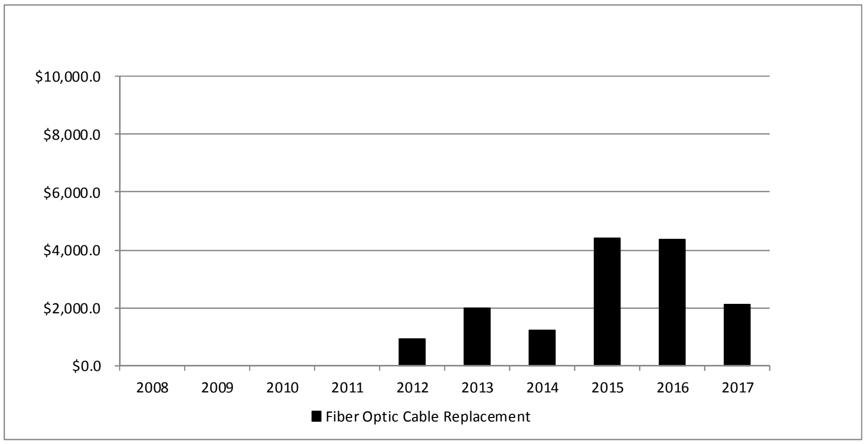
large office facilities, maintaining a reliable fiber network is critical to maintaining reliable operations of the electric grid and business operations.

Since many of our cables were installed in the mid-1990s, the cables are less than 20 years old and we have not had to do much in terms of fiber optic cable replacements. However, as these cables age they will fail due to wear, weather, and other factors. As noted above, we have already determined that about 527 miles of our existing cable cannot support the new fiber optic systems we are installing. Also, we have over 4,400 miles of fiber optic cable, so any large scale replacement program will take many years to complete. Because of these factors, this program will focus on replacing about 188 miles of our oldest cables by 2017. This would address about 4.3 percent of our fiber optic cables.

c) Recorded and Forecast Expenditures

SCE recorded $936,000 for the period 2008-2012 for Fiber Optic Cable Replacement, and forecasts expenditures of $14.136 million for the period 2013-2017 as depicted in Figure III-25 below.

Figure III-25
Fiber Optic Cable Replacement Expenditures
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Fiber Optic Cable Replacement	$0.0	$0.0	$0.0	$0.0	$936.1	$2,000.0	$1,232.2	$4,400.0	$4,380.0	$2,124.4
Total	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$936.1**	**$2,000.0**	**$1,232.2**	**$4,400.0**	**$4,380.0**	**$2,124.4**

(1) Recorded Expenditures

In 2012 we spent $936,100 to replace obsolete fiber cables. In 2012, expenditures were $5.000 million below forecast due to increased time to obtain permits for cable construction.

(2) Forecast Expenditures

In 2013 and 2014 we will increase our spending to $2.000 million and $1.232 million, respectively, to continue ramping up on the replacement of our aging fiber optic cable In the 2015-2017 period, we request additional spending in order to more expeditiously replace obsolete fiber optic infrastructure. We forecast spending $4.400 million, $4.380 million, and $2.124 million respectively. In 2013 and 2014 we plan to replace 27 and 16 miles of fiber, respectively. From 2015-2017 we plan to replace 59, 58, and 28 miles, respectively.[100]

[100] *See* workpaper entitled "Project Cost Estimating Summary- Fiber Optic Cable Replacements."

d) **Conclusion**

SCE's extensive telecommunications network is used for communications among our employees for the dispatch of personnel, for restoration of electric service, for new service activation, to support operations and maintenance of the electric grid, and for interaction with customers and vendors. The Fiber Optic Cable Replacements project replaces obsolete portions of SCE's fiber optic cables to maintain reliable network operations and reduce communications traffic congestion.

11. Microwave Replacements

Table III-23
Microwave Replacements
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-OP-NS-000224	Microwave Replacements

Bt

a) **Background**

The Microwave Replacements budget item is a new budget item created in 2010 that provides for the life-cycle replacement of obsolete, failed, and damaged microwave equipment.

SCE operates and maintains a communications network that includes over 3,027 miles of microwave communications paths. This network is used for communications among our employees for the dispatch of personnel, for restoration of electric service, for new service activation, to support operations and maintenance of the electric grid, and interaction with customers and vendors. The new Microwave Replacements project replaces aging portions of SCE's microwave systems.

b) **Business Requirements**

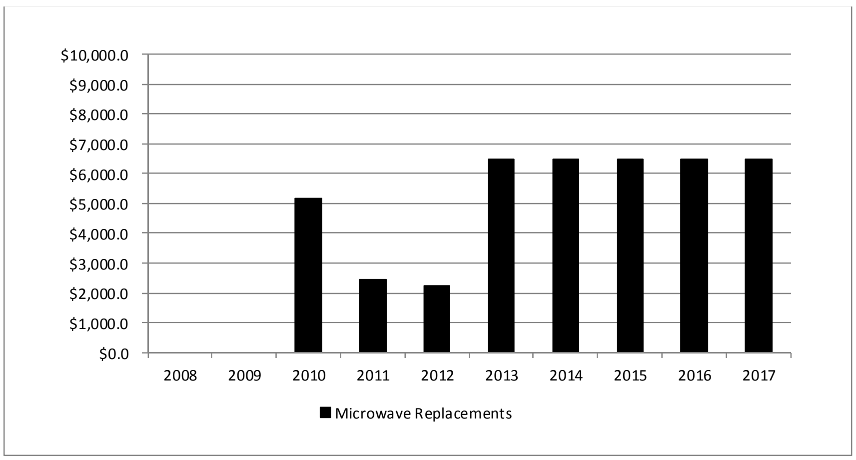
This budget item for the replacement of failed or obsolete microwave terminals. System replacements are necessary when equipment has failed or aged to the point where replacement parts are no longer available from the vendor (which we designate in this section as obsolete). The risk with leaving obsolete equipment in the field is that upon failure, the restore times are lengthy since it requires not just a part replacement but an entire system swap-out. This type of outage could impact our ability to provide safe and reliable service to our customers.

Since many of our systems were installed in the mid-1990s, we did not have to do many microwave system replacements prior to 2009. However, as these systems have started to become obsolete, we have determined a concentrated effort is needed to replace obsolete microwave equipment. We will target replacement of our older, most critical systems in the first years.

c) **Recorded and Forecast Expenditures**

SCE recorded $9.836 million for the period 2008-2012 for Microwave Replacements, and forecasts expenditures of $32.500 million for the period 2013-2017 as depicted in Figure III-26 below.

Figure III-26
Microwave Replacements Expenditures
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Microwave Replacements	$0.0	$0.0	$5,147.9	$2,438.4	$2,250.1	$6,500.0	$6,500.0	$6,500.0	$6,500.0	$6,500.0
Total	**$0.0**	**$0.0**	**$5,147.9**	**$2,438.4**	**$2,250.1**	**$6,500.0**	**$6,500.0**	**$6,500.0**	**$6,500.0**	**$6,500.0**

(1) **Recorded Expenditures**

In 2010 we began the accelerated replacement program with $5.148 million in spending focusing on the critical obsolete microwave equipment. The 2011 and 2012 expenditures were $2.438 million and $2.250 million, respectively, for the replacement of our aging microwave infrastructure.

(2) **Forecast Expenditures**

In the 2015-2017 period, we estimate additional spending in order to adequately replace obsolete microwave equipment. In that timeframe, we aim to replace 20 to 25 microwave paths per year, averaging $6.500 million per year.[101]

[101] *See* workpaper entitled "Project Cost Estimating Summary- Microwave Replacements."

d) **Conclusion**

SCE's extensive telecommunications network is used for communications among our employees for the dispatch of personnel, restoration of electric service, new service activation, to support operations and maintenance of the electric grid, and for interaction with customers and vendors. The new Microwave Replacements project replaces aging portions of SCE's microwave network equipment and systems to maintain reliable network operations and reduce communications traffic congestion.

12. Mobile Radio System Replacement

Table III-24
Mobile Radio System Replacement
Work Breakdown Structure(WBS) ID and Description

WBS ID	Description
CIT-00-ET-AE-000005	Mobile Radio System Replacement

a) **Background**

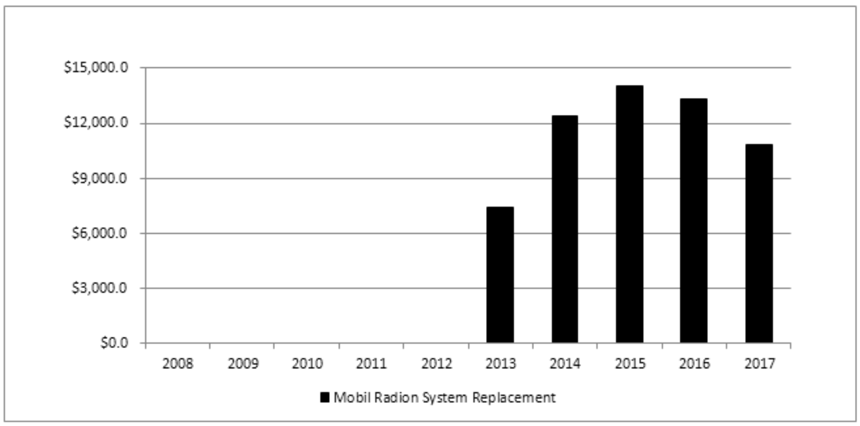
SCE's Mobile Radio System provides voice communications to support field personnel engaged in daily operations, new construction, and emergency response. The current analog based network was implemented in 1994-1995 and replaced a series independent radio systems operated for different Operating Units within SCE. These systems were not interoperable and often the radios were limited geographically, even within the same Operating Unit. The current Mobile Radio System is a unified service used by SCE Operating Units for a variety of tasks including the dispatch of personnel to restore electric service, the operation of the distribution grid in response to adverse conditions, the communication to address dangerous electrical situations, especially during storms and emergencies, and the activation of new service to our customers. This system is critical to business operations as it provides reliable communication outside of other available channels, including cellular services.

b) **Business Requirements**

SCE's current analog Mobile Radio System requires replacement prior to the end of vendor support in 2015. Since SCE operations are dependent on this system as it is often the only means of reliable communication while in remote field locations, the replacement effort must be transparent to SCE field forces. To continue uninterrupted, reliable communication, the replacement must begin by 2013 for the new system to be operational by 2015. If not approved during this GRC, the Mobile Radio System performance will fall out of vendor support. Without the availability of spare parts or vendor maintenance services, the radio system will increasingly be subject to failure, which could affect work efficiency and safety. SCE's ability to promptly restore service to customers after emergencies and disasters would also be critically impaired.

c) Recorded and Forecast Expenditures

Figure III-27
Mobile Radio System Replacement
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded					Forecast				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Mobil Radion System Replacement	$0.0	$0.0	$0.0	$0.0	$0.0	$7,400.0	$12,400.0	$14,000.0	$13,300.0	$10,800.0
Total	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$7,400.0**	**$12,400.0**	**$14,000.0**	**$13,300.0**	**$10,800.0**

(1) Recorded Expenditures

As this is a new project using new technology, it has no recorded costs in prior years.

(2) Forecast Expenditures

The forecast costs are based upon replacing the existing analog mobile radio system with a digital solution. We will retain existing equipment that is dual band (i.e., both analog and digital), and replace equipment that is only analog as depicted in Figure III-27 above. During the period 2013-2017 we forecast the total capital expenditure to be $57.000 million.[102] In 2013, $7.400 million is estimated to replace the system master controller and roughly 460 subscriber units.

[102] *See* workpaper entitled "Forecast Expenditures for Mobile Radio System Replacement."

The master controller manages all communication on the digital-based mobile radio network. The controller keeps track of the different talks groups, personnel connected in each group, which frequencies are available, and many other functions relating to the operation of the Mobile Radio System. The $4.700 million controller replacement comprises the majority of the 2013 costs. The remaining costs are mostly comprised of $1.500 million for subscriber unit replacements. Subscriber units are the personal and vehicle-based mobile radios that will operate in both analog and digital bands. This dual-band functionality will ensure reliable communications while the digital system is being phased into production.

In 2014, $12.400 million is estimated to begin the component replacements of 42 hilltop repeater sites and continue the replacement of an additional 900 subscriber units. SCE has 125 repeater sites used to extend the mobile radio coverage to our service territory including areas where difficult terrain prevents adequate radio reception. Each site requires the analog equipment to be replaced with digital components. Also, $8.400 million is estimated for the repeater site replacements and $3.000 million for the subscriber unit replacement.

In 2015, $14.000 million is estimated to continue the hilltop repeater component replacement of an additional 42 sites and roughly 1200 subscriber units. The costs are estimated at $8.400 million and $4.000 million respectively.

The repeater component and subscriber unit replacements continue in 2016 with $13.300 million estimated in total. Also, $3.600 million is estimated to replace an additional 1,100 subscriber units and $8.000 million is estimated to continue the component replacement at 40 hilltop repeater locations.

In 2017, $10.800 million is estimated to complete replacement of the final 900 subscriber units and 2 hilltop repeater component replacements. These costs are approximately $3.000 million and $0.460 million respectively. These costs include the frequency, testing, engineering, leasing, and installation of new repeater locations.

d) Conclusion

The existing mobile radio system is approaching end of life and will no longer be under vendor support after 2015, which we define as “obsolete”. To maintain reliable field communication and avoid the end of support, the replacement effort must begin in 2013. The solution selected leverages our existing infrastructure and phases the implementation of a digital replacement system. The advantages of this phased approach are that it limits costs by utilizing existing infrastructure and continues to provide essential field communication during the 5-year replacement. If funds are not approved in this rate case, the current radio system will fall into obsolescence without spare parts or vendor support. This is unacceptable as is puts SCE field forces at risk without reliable field communication and limits the response to both daily grid operations and emergency outage situations. Approval for this replacement is essential to our SCE field operations and safety.

B. Risk Management

Table III-25
Risk Management
Work Breakdown Structure (WBS) ID and Description

WBS ID	Description
CIT-00-OP-CS-000001	Disaster Recovery for Mainframe Environment
CIT-00-OP-CS-000002	Disaster Recovery for UNIX Environment
CIT-00-OP-CS-000003	Disaster Recovery for Non UNIX Environment
CIT-00-CC-CC-000016	Flash Copy for Large Database

1. Disaster Recovery

a) Background

Disaster Recovery includes the computing infrastructure necessary to minimize interruption and to recover computing systems in the event of a disaster. Disaster recovery consists of deploying strategies to recover critical systems following a disaster. Critical systems are those that are required by critical business processes, such as power procurement, transmission, and customer service. For such systems, disaster recovery plans are written so that the strategy can be effectively activated in case of a disaster. To ensure that plans are accurate and well understood, they are periodically tested and updated. Computing components of the disaster recovery infrastructure include:

- Disk and tape storage hardware located in an alternate data center apart from production from which to recover data in the event of a disaster;
- Hardware, software, and network communications equipment to enable automatic replication of disk data between data centers; and
- Systems and software that enable high availability of business applications through rapid failover to an alternate data center in the event of a disaster.

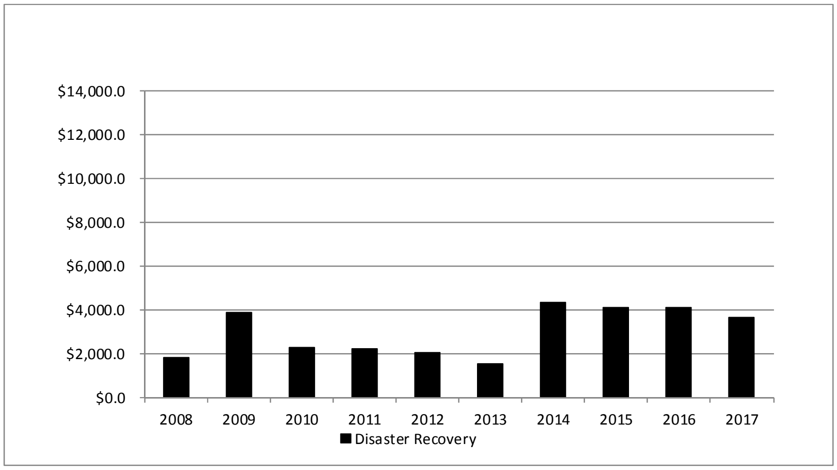
b) Business Requirements

SCE's operations depend on information technology computing systems and applications. During a disaster, SCE's IT Operating Unit performs restoration of information technology components, applications and devices to enable SCE to continue to operate the business. These activities span computing systems and facilities at three primary California data centers located in Alhambra, Irvine, and Rosemead. Disaster recovery capability is achieved through maintaining redundant online capabilities at these locations. When critical applications or systems fail at one location, the impact is mitigated by the resumption of computing system operations at an alternate data center location. Failure of these systems in our business can affect the safety of SCE's employees and impair SCE's ability to provide reliable power to our customers. Disaster Recovery planning and related investments are intended to minimize such occurrences.

c) Recorded and Forecast Expenditures

SCE recorded $12.222 million for the period 2008-2012 for Disaster Recovery and forecasts expenditures of $17.677 million, a 45 percent decrease, for the period 2013-2017 as depicted in Figure III-28 below.

Figure III-28
Disaster Recovery
2008-2012 Recorded and Forecast 2013-2017
(Nominal $000)



	Recorded (2015 case)					Forecast (2015 case)				
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Disaster Recovery	$1,829.3	$3,884.0	$2,235.7	$2,215.4	$2,057.6	$1,500.0	$4,327.1	$4,100.0	$4,100.0	$3,650.0
Total	**$1,829.3**	**$3,884.0**	**$2,235.7**	**$2,215.4**	**$2,057.6**	**$1,500.0**	**$4,327.1**	**$4,100.0**	**$4,100.0**	**$3,650.0**

(1) Recorded Expenditures

The expenditures in the recorded period were primarily driven by refresh of disaster recovery hardware at the end of useful life for the period 2008 to 2012. In addition, disaster recovery hardware was acquired to enhance disaster recovery capabilities for a number of key business systems.

During 2008, $1.829 million was spent to acquire midrange servers to complete the disaster recovery capability for the Outage Management System (OMS). In 2009, we spent $3.884 million to expand the geographical failover capacity and create a Disaster Recovery test environment to validate and certify the automatic failover technologies. An example was $1.665 million to acquire Geographical Dispersed Parallel Sysplex (GDPS) software and hardware to automate and increase the speed of mainframe failover for Customer Service System (CSS) applications and databases.

In 2010 we spent $2.236 million on mainframe, midrange server, and storage capacity expansion for our disaster recovery systems.

In 2011 we spent $2.215 million on mainframe, midrange server, and storage capacity expansion for our disaster recovery systems.

In 2012 we spent $2.058 million on mainframe, midrange server, and storage capacity expansion for our disaster recovery systems.

(2) Forecast Expenditures

For the forecast period 2013-2017, the estimated expenditures are driven by refreshing equipment that has reached the end of useful life[103] and for enhancing disaster recovery capabilities for key business systems. The activities undertaken will give us the ability to recover critical applications within reasonable timeframes as determined by IT and business leadership. The exact expenditure by year is determined by two factors. The first factor is replacement of equipment reaching end of useful life, which is primarily determined by equipment age. The second factor is capacity growth, which is estimated by calculating any additional expenditure on servers and converged infrastructure vertical platforms that will be used for critical business systems that are new to the data centers. If it is determined that these new systems require a disaster recovery capability, then the additional disaster recovery systems are included in our request for that year.

For our rate case period, SCE estimates the following amounts for refresh and additional capacity:

- 2013: $1.500 million
- 2014: $4.327 million
- 2015: $4.100 million
- 2016: $4.100 million
- 2017: $3.650 million[104]

d) Conclusion

The Disaster Recovery services are essential to continuous operation of critical business systems in the event of a disaster. Over the forecast period, we expect to refresh our existing Disaster Recovery environment and enhance existing capabilities

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[103] End-of-useful-life for this equipment is the condition where the reliability is degrading because of age and/or use, or the equipment is no longer supported by the vendor because of age.

[104] *See* workpaper entitled "Forecast Expenditure for Disaster Recovery."

Appendix A

Witness Qualifications

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF JAY A. CASTLEBERRY

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

A. My name is Jay A. Castleberry, and my business address is 4910 Rivergrade Road, Irwindale, California 91706.

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

A. I am the Director of Technology Delivery and Maintenance. In this capacity, I am responsible for the diverse organization providing software solutions for Customer Service, Energy generation and procurement, Transmission and Distribution, Human Capital Management, Enterprise Asset Management, Finance, Compliance, Security, Legal, and Solution Delivery management to our business partners within Southern California Edison.

Q. Briefly describe your educational and professional background.

A. I received my B.S., Business Administration and Hotel/Restaurant Management from California State Polytechnic University-Pomona in 1990. I have worked for Southern California Edison for 1 year. Before joining Southern California Edison, my more recent positions included Information Technology Executive at Ciber from 2008 to 2012, Director of Business Intelligence, Data Warehousing and CRM at Lennar from 2007 to 2008, Director of Infrastructure, Technical and Network Services at Fleetwood Enterprises from 2002 to 2007. Effective August 1, 2012, I assumed the position of Director for Technology Delivery & Maintenance.

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

A. The purpose of my testimony in this proceeding is to sponsor portions of SCE-05, Volume 1, entitled *Information Technology - Overview, O&M and Capital* as identified in the Table of Contents thereto.

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

A. Yes, it was.

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

A. Yes, I do.

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

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?

A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY
QUALIFICATIONS AND PREPARED TESTIMONY
OF TODD INLANDER

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

A. My name is Todd Inlander. My business address is 2244 Walnut Grove Avenue, Rosemead, CA, 91770.

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

A. As vice president of Information Technology and Chief Information Officer for Southern California Edison, I lead the organization responsible for the delivery of technology services to the various organizational units within SCE. In this role, I'm responsible for setting the technology standards for the enterprise, and planning the future technology needs to enable the company to meet its business objectives on behalf of our customers.

Q. Briefly describe your educational and professional background.

A. I hold a Bachelor of Science degree in Mechanical Engineering from Rutgers University College of Engineering. I joined SCE in September 2011 as the Vice President of Client Services, Planning and Controls and was promoted to Vice President and CIO in May 2012. I have also held the title of Vice President and CIO for Edison Mission Group (EMG). Before joining EMG in 2008, I served as CIO of the homebuilding subsidiary of Lennar Homes, responsible for delivering technology solutions to support the needs of homebuilding and land operations. I was also senior vice president and CIO for Fleetwood Enterprises, where I implemented enterprise resource planning and customer-relationship management initiatives to standardize common applications.

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

A. The purpose of my testimony in this proceeding is to sponsor portions of SCE-05, Volume 1, entitled *Information Technology - Overview, O&M and Capital* as identified in the Table of Contents thereto.

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

A. Yes, it was.

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

A. Yes, I do.

Q. Insofar as this material is in the nature of opinion or judgment, does it represent your best judgment?
A. Yes, it does.
Q. Does this conclude your qualifications and prepared testimony?
A. Yes, it does.

SOUTHERN CALIFORNIA EDISON COMPANY

QUALIFICATIONS AND PREPARED TESTIMONY

OF B. "KURT" SWEETSER

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

A. My name is Bradley Kurt Sweetser, and my business address is 4777 Irwindale Ave, Irwindale, CA, 91706.

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

A. I am the Director of IT Client Services & Planning for SCE, which includes planning and delivery of service to IT business unit clients, business process work, and for the controls, architecture, engineering and support functions that have impact across IT. I am responsible for overseeing the planning, demand management, and optimization of IT services to SCE's organizational units.

Q. Briefly describe your educational and professional background.

A. I hold a Bachelor of Science degree in Electrical and Computer Engineering from California State Polytechnic University - Pomona, and almost 20 years of IT experience. My experience at SCE has included serving as general manager of IT Network and Telecommunications, Director of the deployment team and Program Management Office for SCE's Enterprise Resource Planning implementation and in 2009, I assumed the position of Director for Business Relations. I am currently the Director of Client Services & Planning, responsible for planning and portfolio management for business unit clients.

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

A. The purpose of my testimony in this proceeding is to sponsor portions of Exhibit SCE-05, Volume 1, entitled *Information Technology - Overview, O&M and Capital,* as identified in the Table of Contents thereto.

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

A. Yes, it was.

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

A. Yes, I do.

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

A. Yes, it does.

Q. Does this conclude your qualifications and prepared testimony?
A. Yes, it does.