Application No.:	A.23-05-010
Exhibit No.:	SCE-06 Vol. 01
Witnesses:	L. Garris J. Ishiguro A. Ma R. Nanda E. Roddick K. Sweetser

(U 338-E)

2025 General Rate Case

Enterprise Technology

Before the

Public Utilities Commission of the State of California

Rosemead, California
May 12, 2023

SCE-6 Vol. 01: Enterprise Technology

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I.
INTRODUCTION

A. Content and Organization of Volume

This Volume presents Southern California Edison's (SCE) 2025 Test Year forecast of Operations and Maintenance (O&M) expenses and 2023-2028 capital expenditures forecast for the Enterprise Technology Business Planning Element (BPE). This BPE includes the work activities and assets to support SCE's broader Information Technology (IT) needs which are foundational to the operation of SCE. SCE's Enterprise Technology forecast of $290.1 million in O&M expenses for Test Year 2025 and capital expenditures of $1,276.9 million for 2023-2028 will allow SCE to continue necessary work to manage our increasingly complex technology environment, including over 8,900 midrange servers (UNIX, Linux, and Wintel), over 2,000 terabytes of data storage, over 600 data network routing and switching infrastructure, 1,000 appliances to support over 500 large data repository solutions, and operations of SCE's three primary data centers.[1] SCE's presentation of these IT costs (collectively, Enterprise Technology) are structured consistent with our Plan, Deliver (or build), Run (PDR) operating model, which are core to streamlining processes and reducing inefficiencies across ongoing technology operations. The **Plan** function includes the identification, prioritization, and conceptual design of technology investments to enable SCE to meet customers' evolving needs, address regulatory compliance objectives, and support SCE's operational needs. The **Deliver** function includes the project management, logical design and configuration, construction, and deployment of technology products. This function supports the delivery of projects described in SCE-06, Volume 02, Enterprise Technology – OU Capitalized Software. The **Run** function includes management of software products, application maintenance and enhancements, the operation and replacement of IT infrastructure (hardware), and oversight over the Managed Services Providers (MSPs) who directly perform many of the Run functions.

In addition to PDR functions, SCE augmented our IT department several years ago with a renewed focus on digital and process transformation. Digital and Process Transformation (DPT) focuses on: (1) transformation of critical business processes across the company with solutions executed through faster and more efficient methods, (2) enablement of business operations through automation and other

[1] SCE's three primary data centers include the Alhambra Data Center, Irvine Data Center, and Grid Data Center. Expenditures related to SCE's Grid Data Center are addressed in Exhibit SCE-02, Volume 03, Meter Activities.

digital solutions; and (3) support of data driven decision making via advanced analytics. The recorded historical costs and forecasts for these activities have been sequenced according to this workflow and are described in detail in the following chapters:

- Chapter II - Technology Planning, Design & Support (Plan)
- Chapter III - Technology Delivery (Deliver)
- Chapter IV- Digital & Process Transformation
- Chapter V - Service Management Office & Operations (Run)

B. Summary of O&M and Capital Request

SCE's Enterprise Technology forecast of $290.1 million is necessary to support SCE's growing IT portfolio. This includes costs to accommodate:

- Growth in software license and maintenance agreements;
- Maintenance, replacement, and modernization of data centers and network technologies;
- Post-Customer Service Re-Platform Project (CSRP) implementation costs;
- Incremental MSP support for continued support of Grid Modernization, Wildfire Mitigation and new strategic programs, such as IT Service Management Upgrade, Electric Asset Data, and ISU Upgrade;
- Growth in cloud-based services and solutions; and
- Enablement of more digital technologies and data analytics to address needs of customers and SCE operations.[2]

SCE's Enterprise Technology capital expenditures of $1,276.9 million for 2023-2028 include expenditures for technology infrastructure maintenance and replacement that are necessary to support SCE's data center infrastructure and applications, including disaster recovery, server refreshes, storage refreshes, and application upgrades. In addition, the Enterprise Technology capital expenditures provide end-user computing equipment such as desktop computers, laptops, phones, and printing for our approximately 13,388[3] employees across our 50,000 square miles of service territory. IT capital software expenditures for OU and IT projects are discussed in SCE-06, Volume 02. This volume, Volume 1, includes SCE's 2023-2028 Enterprise Technology capital expenditure forecast, which reflects:

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[2] Refer to Exhibit SCE-06, Vol. 01, Chapter IV testimony entitled "Digital and Process Transformation."

[3] 2022 EIX Form 10-K for the fiscal year ended December 31, 2022, p.143. As of December 31, 2022, Edison International had an aggregate of 13,388 employees (excluding interns and employees on leaves of absence), of which 12,831 were full-time employees of SCE or its subsidiaries.

- Routine and deferred refresh of hardware infrastructure beyond the five-year use life cycle, to replace obsolete or unsupported hardware which may be more prone to failure and outages which impact business services internally within SCE and externally for our customers;
- Refresh of high-risk applications no longer supported by vendors or which are about to reach end of life, to mitigate risks to application availability and decrease unplanned outages, ensuring these applications are able to provide needed business functionalities;
- Increased application rationalization focus, continually consolidating our inventory of applications to drive reduction in redundancies, and minimize growing total ownerships costs of technology, with the outcome of increasing safe and reliable execution of our business processes for internal and external stakeholders; and
- Investments for future third-party hosted infrastructure, which is expected to eventually eliminate some dependencies on on-premise infrastructure and improve data storage and delivery capabilities as further discussed in Section C below and Section V.C "Technology Infrastructure Maintenance & Replacement" (specifically the Technology Adoptions sub-work activities).
- Innovation and operational improvements through the development and implementation of software tools that leverage digital and mobile solutions, advanced analytics, and Robotic Process Automations (RPA). This is further discussed in Chapter IV, Digital & Process Transformation.

Figure I-1
Total Enterprise Support O&M Expenses
(Constant 2022 $000)

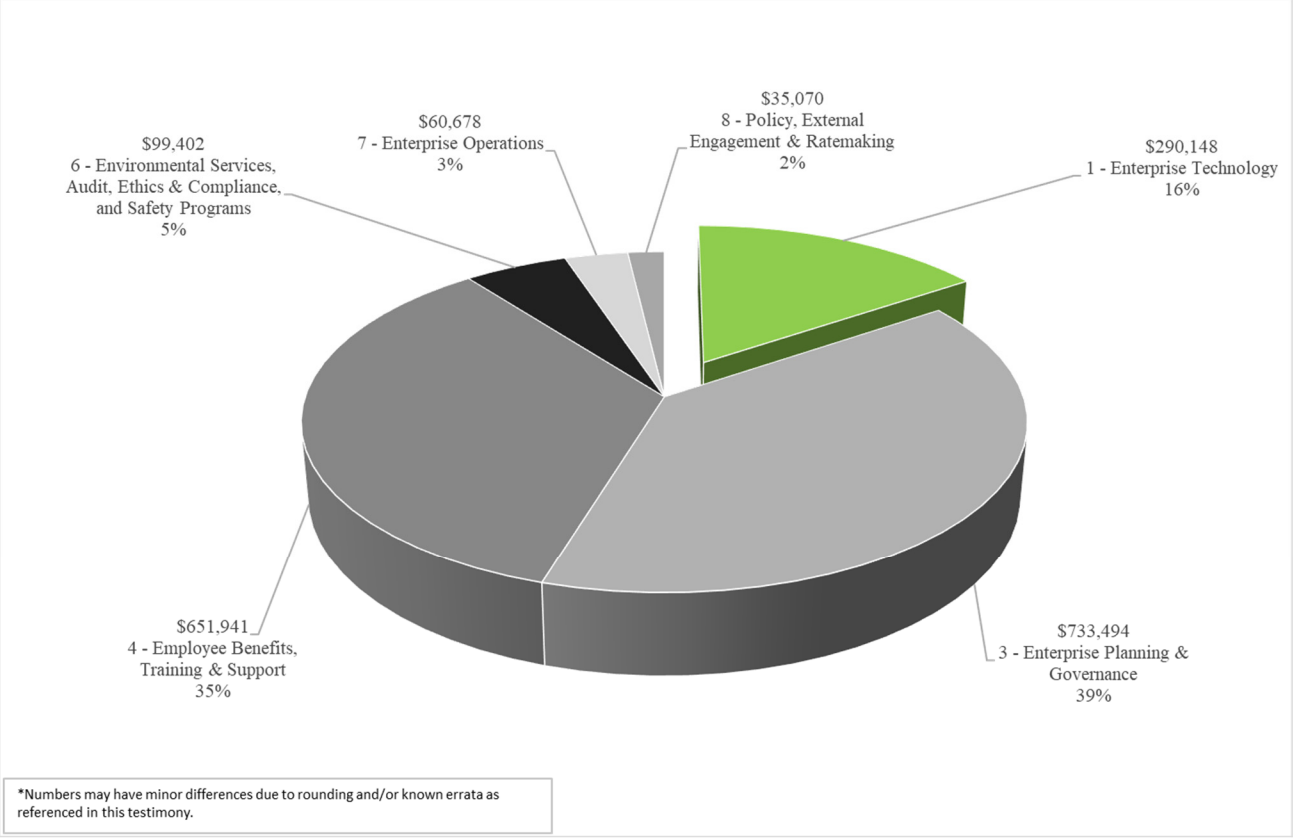
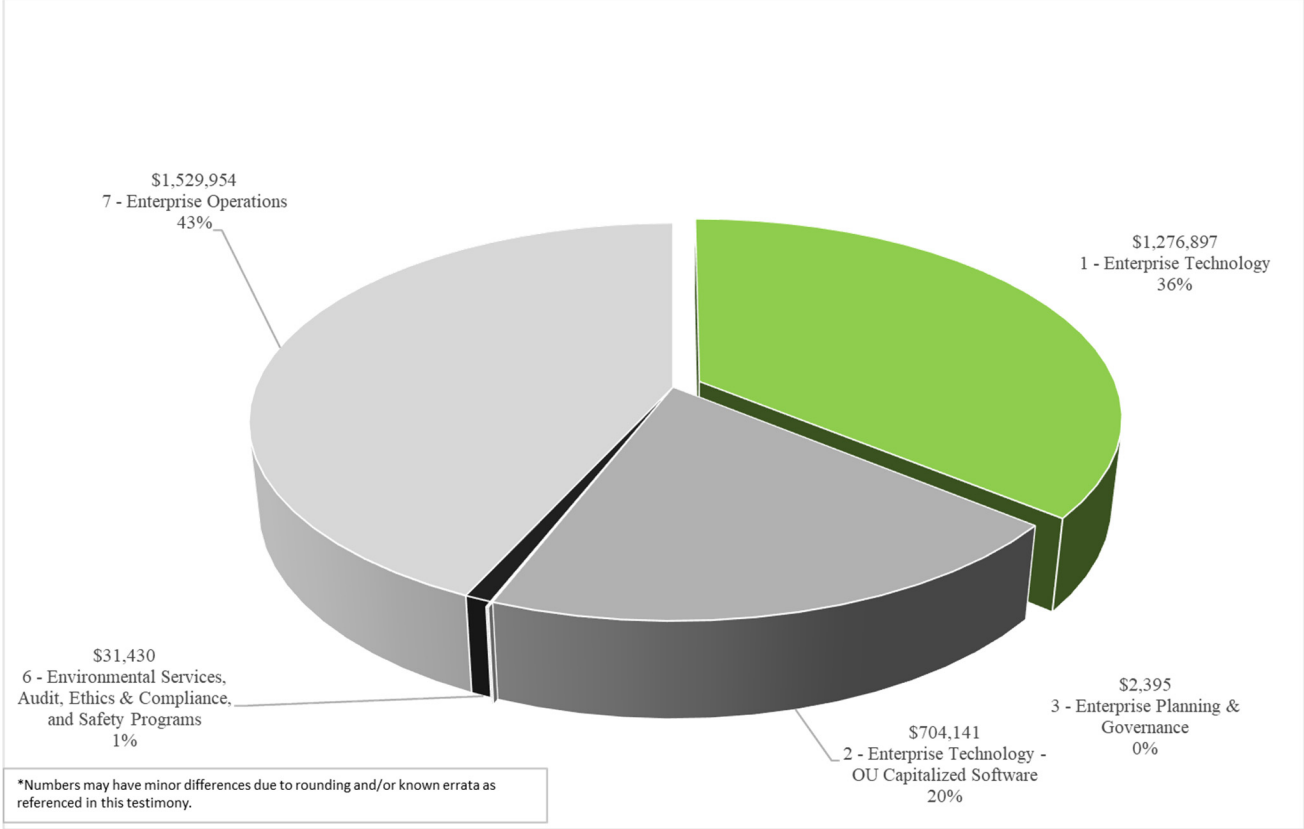


Figure I-2
Total Enterprise Support Capital Expenditures (2023-2028)
(Nominal $000)



C. Enterprise Technology Overview

SCE's Enterprise Technology BPE includes the activities and assets necessary to support the information technology needs that are foundational to SCE's operation. The reliance on information technology has become increasingly essential to business operations across many industries, including the electric utility industry. The basic, yet critical, ability to store, analyze, transmit, and present large amounts of data is foundational for everyday communication and employee productivity, essentially enabling all of SCE's day-to-day activities. In addition to the safe and reliable operation of the grid, the Enterprise Technology BPE also impacts our core competencies in areas such as customer satisfaction and asset management. With our technology landscape changing at an unprecedented pace, so does the availability of new options to serve our business and customer needs. SCE continues to develop new tools for customers that convey the information they need to make clean energy choices and support

California's aggressive climate change goals.[4] We also continue to identify and implement technology solutions to help our operations run more safely, reliably, and efficiently. In recent years, SCE has increasingly relied on digital technology, including doing things like switching from internet phones to Microsoft Teams to enable virtual collaboration efficiencies, or moving from paper to mobile devices for field inspections to improve data quality. This ensures our core collaboration systems are on a modern platform, which enables SCE to consolidate tools, improve processes to better manage work, and advance the ways we communicate with our customers. All of these improvements make a significant contribution toward improving operational efficiencies. In addition, we continue to integrate more third-party cloud technology into our operating environment, which will improve agility and innovation, increase business and IT efficiency, improve availability, reliability, and disaster recovery, and lower long-term costs. The following sections will provide an update on the various strategic efforts that continue to be a priority for Enterprise Technology and SCE during this GRC period.

1. Enterprise Technology Focus & Operational Improvements

In SCE's 2021 GRC, Enterprise Technology focused on mitigating cost pressures driven by changing technology landscapes. Some of these cost pressures will continue to extend into this GRC period, and new drivers have also emerged, as summarized below:

- Support for Grid Modernization, requiring on-going maintenance for hardware and software that are making our power grid safer, more flexible to accommodate customer adoption of distributed energy resources, more responsive to energy management needs and grid emergencies, and able to address various DRP compliance requirements;[5]
- Support for our new customer service systems, which requires changing knowledge and skillsets in the operation of technology solutions and the analysis of a growing amount of customer data;
- Continued support for grid hardening to mitigate wildfires, which requires new technology that increases SCE's flexibility to respond to wildfires quickly and provides predictive capabilities to ensure our customers and power grids are safe from these emerging threats;

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[4] Senate Bill (SB) 32 requires California to reduce its greenhouse gas (GHG) emissions to 40% below 1990 levels by 2030.

[5] *See* Exhibit SCE-02, Vo1. 04 and Exhibit SCE-04, Vol. 03.

- Pace of technological advancement and the availability of new options to serve our business and customer needs (e.g., emergence of cloud-based services and applications); and
- Regulatory demands (e.g., NERC Critical Infrastructure Protection (CIP)) for a more secure and reliable grid.

We are managing previously described pressures in the period of 2019-2024 through the operational improvements discussed below. We will continue to maintain the results of these operational improvements and implement other strategic initiatives to improve our operations in a cost-efficient manner and to ensure regulatory and compliance mandates are met during this GRC period.

a) IT Modernization and Simplification

To ensure we are prepared for the increasing and evolving demands on our IT physical assets, tools, and processes, we will continue to focus strategically on developing capabilities that are focused on modernizing and simplifying our IT service model. Some of the core components of this strategy include, but are not limited to:

- Digital – enablement of disruptive innovation to improve time to value and streamline operations by leveraging digital tools and platforms. This will also require a robust digital operations function to maintain these new capabilities once they are implemented in SCE's IT environment. Furthermore, SCE will need to continue our adoption of agile, automation and DevOps[6] frameworks to improve the efficiency and overall quality of our agile delivery, DevOps, and digital platforms, operations and solution deployments.
- Data/Analytics – improving our ability to quickly analyze patterns and develop business insights by leveraging data across a variety of sources and mediums.
- Cloud – leverage cloud-based solutions when upgrading and replacing applications in order to decrease our data center footprint and increase our delivery capabilities with a focus on speeding up time to value.

[6] DevOps is a methodology in the software development and IT industry. Used as a set of practices and tools, DevOps integrates and automates the work of software development (Dev) and IT operations (Ops) as a means for improving and shortening the systems development life cycle.

- Integration – improving integration across applications, systems, and interfaces to improve efficiencies and simplify the architecture across SCE's enterprise to increase productivity and decrease complexity in the future
- Technology Simplification – a more sustainable, secure, and cost-effective technology environment that delivers high levels of business capabilities and executes business processes more efficiently. The focus is to reuse software and hardware to deliver multiple solutions and to reduce the overall number of applications supported.
- Technology Rationalization – improving our capabilities to consistently and systematically refine our business operations and processes in a way that allows us to more frequently decommission applications and platforms. Our Application Rationalization initiative, described immediately below, is one of the ways we are specifically focusing on operational excellence improvements.

b) Application Rationalization

As an example of technology simplification and rationalization, IT has initiated the Application Rationalization initiative to optimize the technology application portfolio. Prior to the completion of the Application Rationalization Initiative, IT managed approximately 900 different technology applications to support operating units across SCE. Until recently, funding constraints and competing business priorities have prevented the team from making substantial progress in modernizing, consolidating, or removing existing applications. The Application Rationalization Initiative is being pursued as part of the broader company-wide Operational Excellence Catalyst (OEC) effort, which is focused on driving process improvements that will provide positive impacts towards safety, affordability, and quality.[7] Optimizing the IT applications portfolio will save $6.8 million in O&M savings (constant dollars) and $3 million in capital savings. This effort will also improve IT service operations for years to come. To that end, we have started to execute an Application Rationalization initiative, as discussed further in section V.B.4.b.4, Application Rationalization, below.

[7] For additional background on SCE's Operational Excellence Catalyst (OEC) effort, see Exhibit SCE-01, Vol. 01, Policy.

c) Regulatory Background / Policies Driving SCE's Request

Enterprise Technology's O&M expenses and capital expenditures are impacted by various CPUC and FERC regulatory mandates both directly and indirectly as IT provides companywide technology-based support that is key to SCE's ability to meet compliance mandates. As SCE's regulatory environment continues to become increasingly complex, so does SCE's reliance on technology projects to maintain compliance. These compliance requirements are primarily discussed in the respective IT testimony sections in the following volumes: SCE-02, Volume 04 (System Augmentation), SCE-04, Volume 03 (Cybersecurity & Compliance), and SCE-06, Volume 02 (OU Capitalized Software).

d) Compliance Requirements

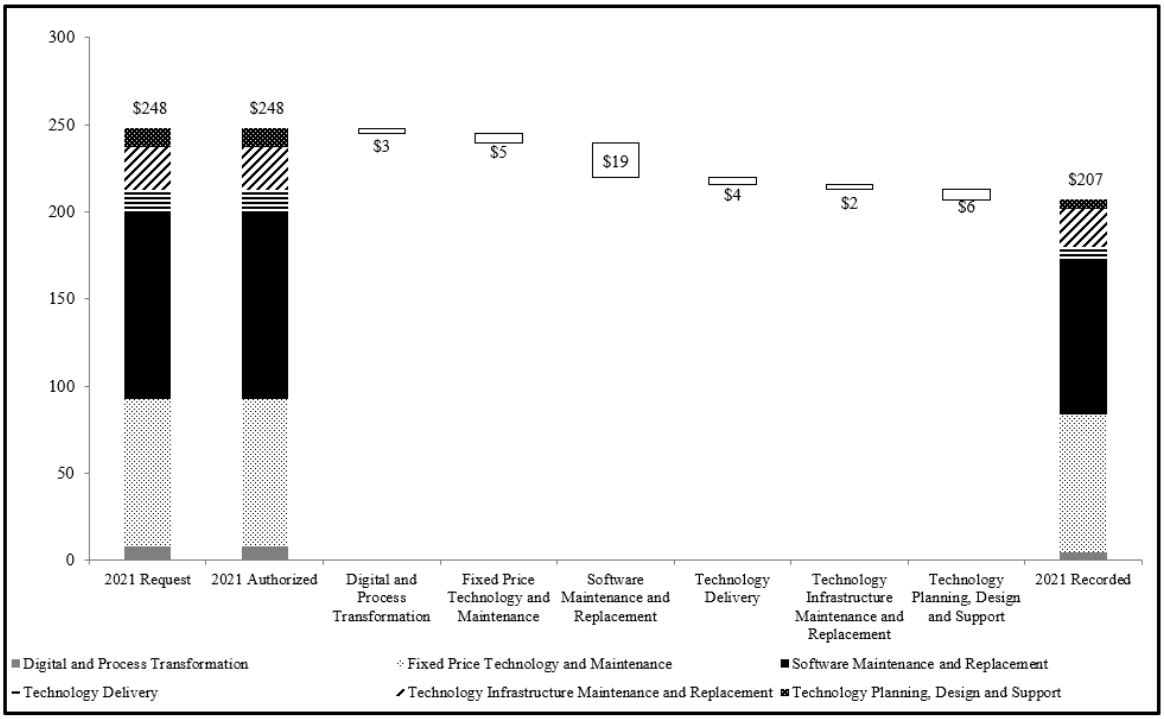
In SCE's 2015 GRC, the CPUC required that SCE "include its own forecast and the Commission's adopted forecast from the previous GRC alongside historical costs, and brief explanations detailing any changes in the scope of a category."[8] A summary forecast is provided in the Introduction section and the testimony for each O&M and Capital GRC activity is discussed in detail in each section below.

[8] D.15-11-021, p. 224.

D. 2021 Decision

1. Comparison of Authorized 2021 to Recorded – O&M

Figure I-3
Enterprise Technology
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $ Millions)

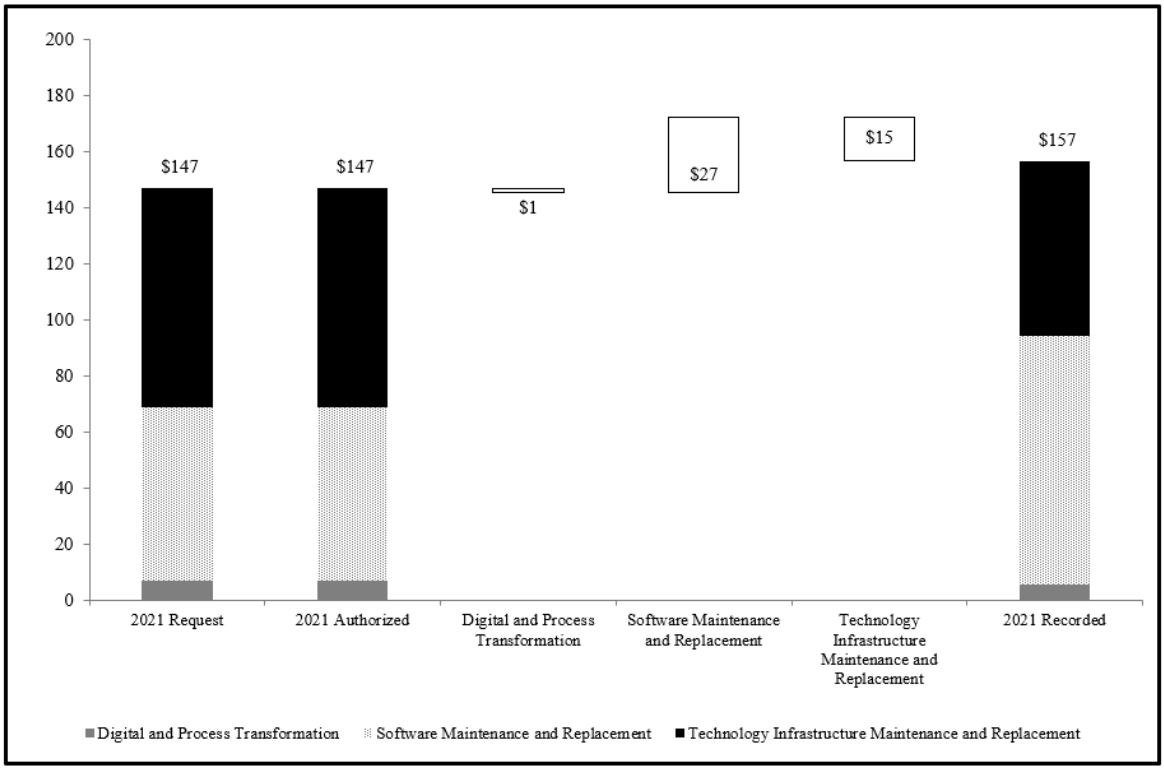


As shown in Figure I-3, SCE was authorized $248.1 million, and recorded $206.7 million in 2021 O&M expenses for Enterprise Technology, which is a $41.4 million underrun.[9] A significant portion of this underrun is driven by the Software Maintenance & Replacement activity, which produced savings related to moving to third party support, decommissioning applications, or cost savings in vendor negotiations. Other major reasons for this underrun include savings incurred through prudent negotiations with our managed services partners and the optimization of expenses in the delivery phases. These underruns are described in more detail in the work activity sections below.

[9] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

2. Comparison of Authorized 2021 to Recorded – Capital Expenditures

Figure I-4
Enterprise Technology
Comparison of 2021 Authorized versus Recorded Capital Expenditures
(Nominal $ Millions)



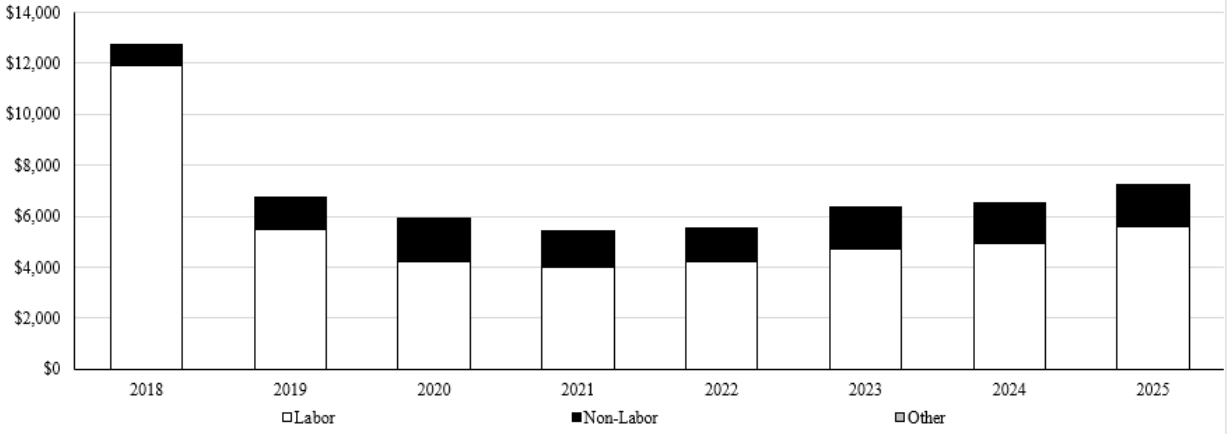
As shown in Figure I-4, SCE was authorized $147.3 million in 2021 capital expenditures for Enterprise Technology. SCE recorded $156.9 million in 2021, approximately $9.6 million over authorized.[10] This was primarily due to executing a major restructuring of our Microsoft portfolio which resulted in higher spending than originally estimated. This spending, as well as the additional benefits from the Microsoft restructuring, are discussed in Chapter V.

[10] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

II.

TECHNOLOGY PLANNING, DESIGN & SUPPORT

Figure II-5
Technology Planning,
Design & Support O&M Expenses[11]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$11,900	$5,485	$4,241	$3,992	$4,206	$4,722	$4,958	$5,610
Non-Labor	$846	$1,254	$1,695	$1,466	$1,336	$1,627	$1,563	$1,657
Other								
Total Expenses	**$12,747**	**$6,739**	**$5,936**	**$5,459**	**$5,543**	**$6,349**	**$6,521**	**$7,267**

A. Work Description

This activity comprises the planning and design of enterprise technology, which informs investment strategies and technology standards across SCE. Planning includes the identification, prioritization, and design of technology investments to enable SCE to meet customers' evolving needs, address regulatory compliance objectives, and support SCE's operational excellence needs. It also involves working closely with SCE business areas to understand both unique and shared business drivers and define long-term business and technology capabilities that will support our business objectives in responding to the business drivers. Because business priorities are constantly evolving and the pace of technology is advancing quickly, this planning component is important to validate that the right work

[11] Refer to WP SCE-06, Vol. 01, pp. 1-7 Technology Planning, Design and Support – Standard O&M Workpapers.

activities are being pursued, prioritized, and in alignment with other business needs across SCE. Ultimately, technology planning is responsible for demand and capacity management of technology projects, serving as the single gateway to all work in the Enterprise Technology category.

Technology design is the architecture or blueprinting of technology solutions to achieve the desired business capabilities. This activity is critical as system enhancements, integrations, and upgrades are an increasingly foundational enabler to achieving SCE's strategic objectives. For example, SCE's focus on cleaning the power system through modernizing our electric grid consists of building a smarter grid that relies on technology to maintain stability and achieve a higher level of resilience. This requires extensive understanding of our grid, systems and control theory, computer science, power systems, and utility operations. Putting this knowledge together with alternative solutions ensures the design of proposed system implementation and enhancements does not create an unnecessary risk of unforeseen technology incompatibilities resulting from the introduction of new technology products interfaces or enhancements to our existing production environments. Technology design also includes estimating the costs of IT projects requested throughout the company. Building on the Commission's direction from past rate case filings,[12] and industry best practices, SCE utilizes a standard IT cost estimation model to develop cost estimates for all prospective IT projects. This model identifies several cost components and factors used in the estimation process, including:

- Commercial-off-the-Shelf (COTS) and Development approaches;
- Labor rates;
- Labor expenses (including project labor and post-implementation support labor);
- Capitalization of on-going licensing fees;
- Vendor allocations (including effort driven and fixed price); and
- Non-labor costs (hardware and data center, software license, etc.).

SCE uses this model, which is discussed in more detail in SCE-06, Volume 02 to estimate the costs of the capital software projects it requests. In doing so, the project costs have been estimated using a consistent methodology for all projects that have forecast spending in 2023 and 2024.[13]

[12] D.19.05-020.

[13] *See* Exhibit SCE-06, Vol. 02, for SCE's 2023-2028 OU Capitalized Software Portfolio.

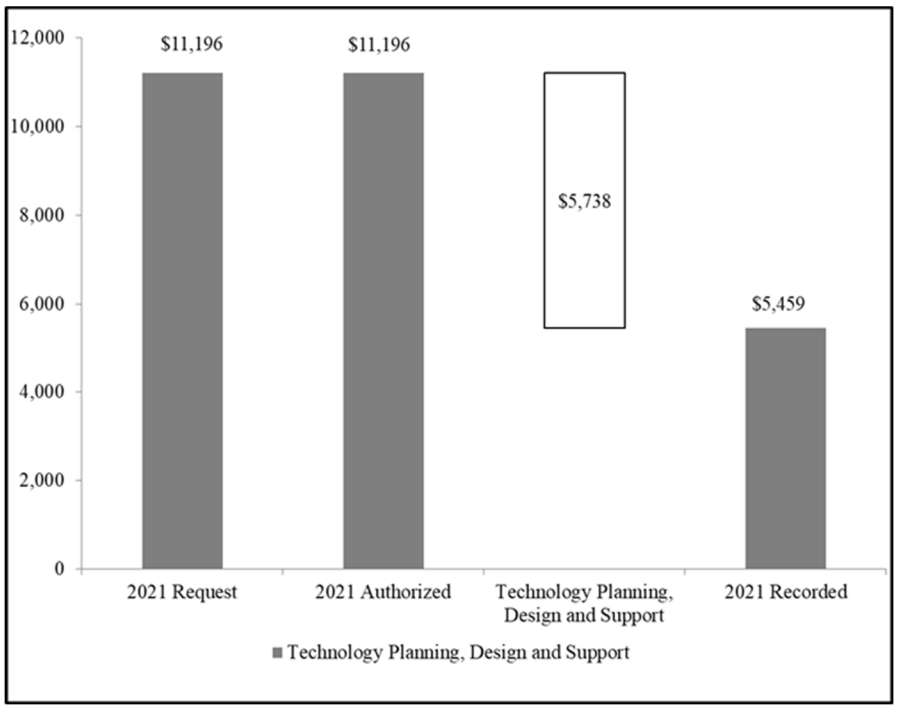
Finally, this activity includes the provisioning of IT business support services, including support for IT staffing needs, all procure-to-pay and invoice processing support, coordination of space/facility allocation, and training.

B. Need for Activity

This activity is necessary to manage and prioritize technology investments as well as estimate the costs of new technology project requests across the enterprise. Because a part of the technology planning activity also includes finding ways to leverage existing solutions across BPGs, this activity helps filter and eliminate the creation of applications with duplicate functionality which could lead to unnecessary complexity and increased maintenance costs. Through this holistic planning approach, as well as the risk analyses performed on our systems' architecture design, SCE can strategically purchase and develop hardware and software assets. This enhances our ability to manage our technology costs more effectively, while also helping to mitigate risks associated with implementing new technology applications and solutions. For these reasons, the need for this activity will continue to be critical as SCE and our customers increasingly rely on the benefits of technology.

C. Comparison of Authorized 2021 to Recorded

Figure II-6
Technology Planning, Design & Support
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $000)



SCE was authorized $11.196 million for Technology Planning, Design & Support in the 2021 GRC. This work activity's recorded 2021 expenses were approximately $5.459 million, which was $5.738 million below authorized.[14] SCE underspent authorized levels because of a decrease in Technology Design labor driven primarily by the re-organization of resources to other areas within the organization, specifically to Service Management Office & Operations (SMOO) and Technology Delivery. This re-organization allowed for streamlined deployment of resources to better align with specific architectural focus areas and the changing business needs across the organization.

[14] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

D. Scope and Forecast Analysis

Table II-1
Technology Planning, Design & Support O&M Expense[15]
2018-2022 Recorded/Forecast 2023-2025
(Constant 2022 $000)

	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$11,148	$5,485	$4,241	$3,992	$4,206	$4,722	$4,958	$5,610
Non-Labor	$846	$1,254	$1,695	$1,466	$1,336	$1,627	$1,563	$1,657
Other								
Total Expenses	**$11,994**	**$6,739**	**$5,936**	**$5,459**	**$5,543**	**$6,349**	**$6,521**	**$7,267**

1. Historical Variance Analysis

a) Labor

As illustrated in Table II-1, Technology Planning, Design & Support labor expenses decreased from 2018-2019 by 51% percent due to re-organization of Technology Design staff to other departments within the IT organization. The re-organization allowed for better alignment of planning functions with different parts of the organization in order to streamline the ability to provide better quality support across multiple business areas. Labor decreased further from 2019-2020 as staffing in Technology Planning, Design & Support was reduced in order to support staffing needs in other departments of the organization. Labor expenses remained relatively flat from 2020-2022.

b) Non-Labor

As shown in Table II-1, non-labor costs increased from $0.846 million to $1.254 million from 2018 to 2019 due to the execution of additional contract labor and consulting services to meet project demands. An additional increase from $1.254 million to $1.695 million took place from 2019-2020 due to additional support services for quality reviews of solution designs. Non-labor costs remained relatively flat from 2020 – 2022.

2. Basis for Forecast

a) Labor

SCE's 2025 Test Year labor forecast is $5.610 million, which is an increase of approximately $1.404 million over last recorded year for 2022.

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[15] Refer to WP SCE-06, Vol. 01, pp. 1-7 Technology Planning, Design and Support – Standard O&M Workpapers.

As discussed in the historical variance analysis above, the labor costs decreased significantly from 2018 to 2019 due to re-organization, followed by minor fluctuations from 2019 to 2022 as a result of continued refinement of staffing levels. As part of the ongoing efforts for continuous improvement, SCE developed a forecast that allows for the development of in-house expertise, which is the primary driver of the increase in test year forecast. This continuous improvement effort is intended to increase the knowledge base with in-house personnel while limiting the use of outside resources. Specifically, SCE is insourcing (replacing contract labor with full-time employees) ten software architects to increase productivity and savings on capital projects in the long term. As more expensive contractors are replaced with architect and engineering employees, procurement cycle times, learning curves and hourly rates will decrease on capital projects over time. However, replacing contractors with full time employees does result in some increased labor costs, namely a 10% increase for each insourced position for overhead and administrative activities.

Additional drivers of the increase included the filling of five vacancies related to enterprise architecture and back-office functions, as well as a movement of three full-time employees (FTEs) from Digital & Process Transformation to better align organizational functions. The remainder of the increase is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol. 04. For further details, please see our detailed workpaper.[16]

b) Non-Labor

SCE's 2025 Test Year non-labor forecast is $1.657 million, which is a $0.321 million increase to SCE's 2022 recorded expenses. This is reflective of the insourcing activities above and does not include any architecture contractors. The non-labor forecast for this test year contains mostly subscription and membership fees for benchmarking against utility peers, including the cost of a membership that was moved from Cybersecurity to Technology Planning, as well access to industry resources, which are important to SCE's IT organization because these resources help SCE stay current on important industry trends and best practices in technology. Access to industry resources benefits customers because it enables SCE to adapt quickly to changing industry demands and to enhance new technologies to improve customer safety and convenience. Sharing best practices with other utilities helps SCE make operations more efficient by learning new processes that help improve performance.

[16] Refer to WP SCE-06, Vol. 01, pp. 8-9 - Tech Planning Design & Support Labor.

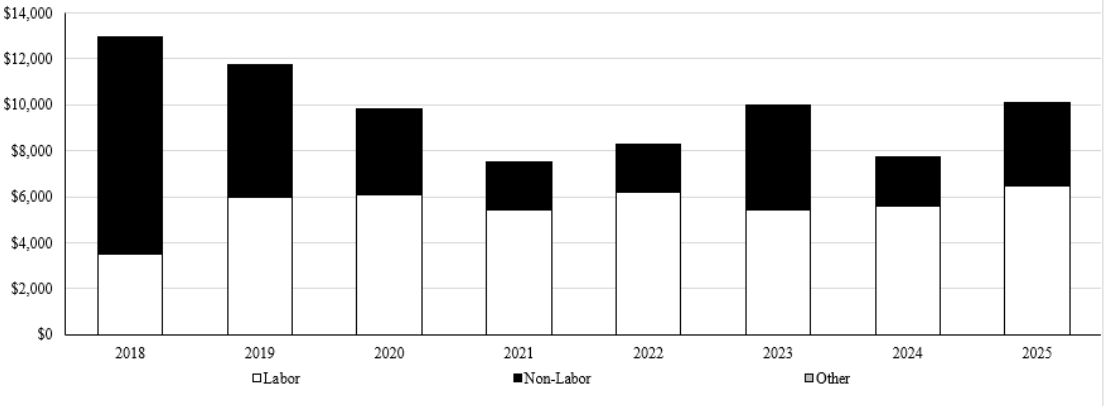
Moreover, SCE's membership and subscriptions also provide access to networks, data, expertise, conferences, and educational workshops that allows SCE to streamline, improve, and reduce costs of internal processes to provide more affordable and resilient technology solutions. Other expenses in this forecast include normal employee expenses (training and office supplies). For details of these expenses, please see our workpaper.[17]

[17] Refer to WP SCE-06, Vol. 01, pp. 10-11 - Tech Planning Design & Support Non-Labor.

III.

TECHNOLOGY DELIVERY

Figure III-7
Technology Delivery O&M Expenses[18]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	2019	2020	2021	2022	2023	2024	2025
Labor	$3,524	$5,958	$6,070	$5,439	$6,218	$5,445	$5,623	$6,450
Non-Labor	$9,356	$5,814	$3,752	$2,091	$2,047	$4,530	$2,125	$3,646
Other	$							
Total Expenses	**$12,880**	**$11,772**	**$9,823**	**$7,530**	**$8,265**	**$9,975**	**$7,749**	**$10,096**

A. Work Description

Technology Delivery is the execution of non-routine system enhancements and implementation of the capital software projects for SCE's OUs that are requested in SCE-06, Volume 02, OU Capitalized Software. This includes the overall project management required end-to-end across the necessary planning, design, business case approvals, and implementation. The delivery team partners with the sponsoring business area to organize the approved work and manages it to completion using the most cost-effective methodology. In addition to the execution of the project, the Technology Delivery activity encompasses management of transitioning the software to a live state in production and post-implementation stabilization activities, as well as verifying business readiness of the technology deployment. In instances where technology deployment impacts many users, organizational change management (OCM) activities are also led by the delivery team.

[18] Refer to WP SCE-06, Vol. 01, pp. 12-18 Technology Delivery – Standard O&M Workpapers.

In addition to the delivery services, this GRC activity also includes O&M expenses incurred to support the capitalized software projects across SCE's BPGs. The O&M expenses consist of the following activities required to develop and implement capitalized software:

- Pre-project planning activities, such as business requirements development, conceptual solution engineering, data migration, and data cleansing; and
- Delivery of end-user training associated with the technology, which includes developing training material and providing training to end-users.

Finally, this GRC activity includes certain projects which are mostly or completely O&M. These projects are typically small (<$250,000) and address targeted requirements in a specific area of our business, or are not focused on new assets, such as the Lotus Notes Decommissioning project.[19] These O&M projects primarily involve minor installation of small-scale new products when SCE does not have the software capability within our existing portfolio.

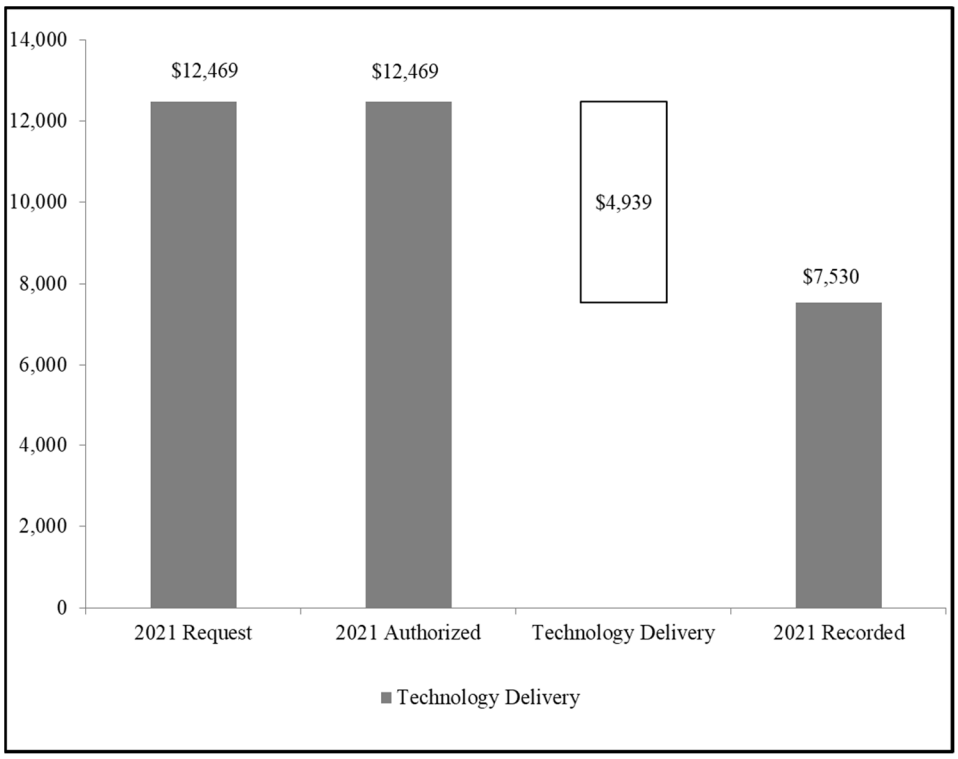
B. Need for Activity

The Technology Delivery activity is essential to the efficient and cost-effective management of the scoping, scheduling, and budgeting of software projects, both foundational and strategic across the enterprise. It is critical to minimize disruption to existing systems and processes as new capabilities are enabled and connected to existing systems. Further, this activity drives accurate and timely visibility into our technology investments and enforces project management standards and quality control principles to enable IT solutions to meet the needs of the organization. These quality control activities minimize errors and rework after a project is completed.

[19] *See* Exhibit SCE-06, Vol. 02, Section V.D.6 Lotus Notes Decommissioning.

C. Comparison of Authorized 2021 to Recorded

Figure III-8
Technology Delivery
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $000)



IT's O&M recorded for Technology Delivery of $7.530 million in 2021 is less than the 2021 GRC authorized amount of $12.469 million by $4.939 million.[20] Technology Delivery's underrun was driven by changes in Capital Related Expenses and O&M projects, namely (1) further assessment of planned work that determined capital treatment to be the more appropriate treatment for the project, and (2) the optimization of expenses in the delivery phases for certain software. This is offset by a slight overrun in labor and related expenses. These reasons are expanded further below:

Capital Related Expense & O&M Projects: 2021 recorded costs are $5.452 million less than authorized due to targeting efficiencies, economies of scale, and lower cost of in-house resources on project deliverables like organizational change management (OCM), communications, training, etc. We also executed fewer O&M projects because projects were deferred in lieu of higher priority efforts.

[20] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

Additionally, we began applying the principle that, under certain conditions, implementation and other costs on cloud projects previously forecast as O&M could be capitalized. In other words, since its initial forecasting of these projects for the 2021 GRC (in 2019), SCE has developed better, project-specific information. While these costs were originally categorized as O&M, SCE's improved understanding led to the conclusion that these project costs could be capitalized. These underruns were additionally offset by an overrun on the other Non-Labor related expenses, mostly related to the inclusion of Time-of-Use (TOU) Default Full Roll-Out and Rate Comparison projects.

Labor & Related Expenses: 2021 recorded costs are $0.513 million higher than authorized due primarily to O&M components related to the need to expand the capacity to execute on delivery of projects to meet each portfolio's demand, particularly focused on Grid Resiliency and Grid Mod execution and an overall shift in charging practices in non-capital planning efforts to increase quality.

D. Scope and Forecast Analysis

Table III-2
Technology Delivery O&M Expenses[21]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$3,524	$5,958	$6,070	$5,439	$6,218	$5,445	$5,623	$6,450
Non-Labor	$9,356	$5,814	$3,752	$2,091	$2,047	$4,530	$2,125	$3,646
Other	$							
Total Expenses	**$12,880**	**$11,772**	**$9,823**	**$7,530**	**$8,265**	**$9,975**	**$7,749**	**$10,096**

1. Historical Variance Analysis

a) Labor

As shown in Table III-2, labor expenses increased from $3.524 million to $5.958 million from 2018 to 2019 due to multiple factors including a reorganization and an increase in project demands. Labor costs remained flat from 2019 to 2020, then decreased by 10 percent from 2020 to 2021 due to the impact of COVID on our Labor Force availability and a fine tuning of our prioritization model that led to a small decrease in project count. Labor expenses remained relatively stable from 2021 to 2022.

[21] Refer to WP SCE-06, Vol. 01, pp. 12-18 Technology Delivery – Standard O&M Workpapers.

b) Non-Labor

As shown in Table III-2, non-labor expenses decreased from $9.356 million in 2018 to $5.814 million in 2019 due to continuous cost optimization improvements to reduce our non-labor expenses. Non-labor costs decreased further to $3.752 million from 2019 to 2020 as a continuing result of these same improvements and decreased spending due to COVID. Non-labor expenses decreased by 44 percent between 2020 and 2021, then held steady at $2.047 million from 2021 to 2022 due to the lasting impacts of remote work on employee and project expenses. Lower non-labor expenses resulted from reductions in employee training and development, travel expense, and office expenses. Project expenses were lower during this period as well, due to limited change management (OCM), communications, training, and fewer O&M projects in lieu of higher priority efforts.

2. Basis for Forecast

a) Labor

As shown in Table III-2, SCE's labor expenses are forecasted to consistently stay level. The slight increase in 2025 is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol.04.

SCE uses last year recorded with an adjustment to account for an increase in resources for project support. SCE uses 2022 recorded expenses of $6.218 million as the basis to estimate the 2025 Test Year labor forecast in this activity. Since we forecast a similar volume of activities for our resources as 2022 recorded year, the base year is a reasonable reflection for SCE's 2025 Test Year forecast of $6.450 million.

b) Non-Labor

This category of the forecast includes employee-related expenses such as training and office supplies for SCE labor recorded to the Technology Delivery activity. It also includes recurring expenses of $57,353 annually for O&M projects that cannot be capitalized, primarily geared towards driving efficiencies and cost savings across the enterprise.

Lastly, the largest portion of this category includes O&M capital-related expenses incurred for executing OU capitalized software projects such as OCM activities and materials and contracting for third-party service providers who have subject matter expertise within the industry or technology-specific knowledge in implementing projects.

Historically, SCE incurs roughly 4% of O&M expenses relative to SCE's capitalized software portfolio. SCE applies this 4% to the $110.86 million capital Test Year 2025

forecast in SCE-06, Volume 02, OU Capitalized Software. There is an increase in Test Year 2025 over the 4% resulting in a non-labor forecast of $5.259 million for 2025. This is attributable to an individual project (PowerPlan Upgrade 2023) requiring more O&M than typical. This increase does not affect SCE's forecasts for years 2026-2028, which explains the decreases in those years.[22] To account for these fluctuations, these 2026-2028 increases have been normalized[23] and adjusted into the Test-Year 2025 forecast for ratemaking purposes.

As explained in detail in SCE-06, Volume 02, SCE is utilizing a hybrid forecast methodology as part of the OU capitalized software portfolio forecasts. A corresponding hybrid forecast is also required for capital-related O&M expenses to implement those projects with high quality and reliability.

[22] Refer to WP SCE-06, Vol. 01, pp. 19-20 Technology Delivery Non-Labor.

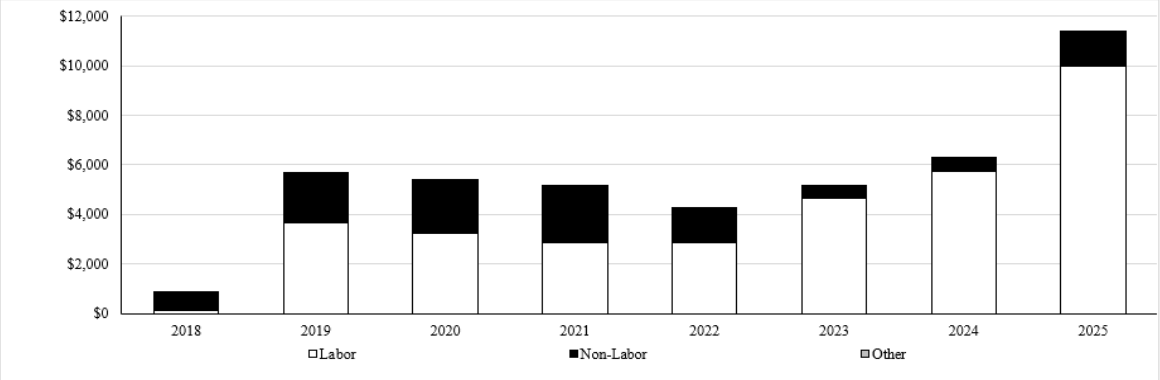
[23] This is a normalized forecast. Calculation of normalization amount is as follows: [2025 amount of 5,260 + 2026 amount of 3,176 + 2027 amount of 3,109 + 2028 amount of 3,039] /4= the updated 2025 normalized amount of **$3,646**. Dollars are in constant and in '000.

IV.

DIGITAL & PROCESS TRANSFORMATION

Figure IV-9 provides 2018-2022 recorded and 2023-2025 forecast O&M expenses, broken down by labor and non-labor, for the Digital & Process Transformation work activity.

Figure IV-9
Digital & Process Transformation O&M Expenses[24]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

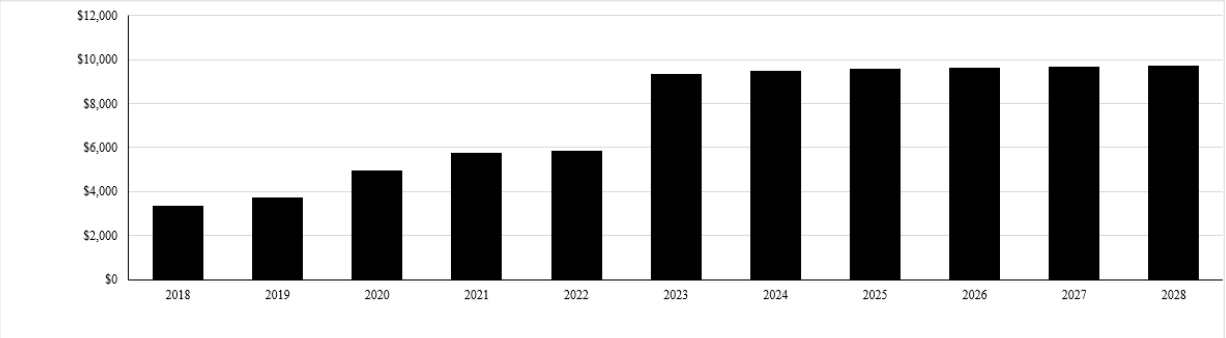


	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$133	$3,681	$3,256	$2,872	$2,879	$4,667	$5,755	$9,989
Non-Labor	$774	$2,007	$2,150	$2,319	$1,419	$502	$570	$1,419
Other								
Total Expenses	**$908**	**$5,688**	**$5,405**	**$5,191**	**$4,298**	**$5,170**	**$6,325**	**$11,408**

Figure IV-10 provides 2018-2022 recorded and 2023-2028 forecast Capital expenditures for the Digital & Process Transformation work activity.

[24] Refer to WP SCE-06, Vol. 01, pp. 21-30 Digital and Process Transformation – Standard Workpapers.

Figure IV-10
Summary of Digital & Process Transformation Capital Expenditures[25]
Recorded 2018-2022 / Forecast 2023-2028
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Digital and Process Transformation	$3,336	$3,703	$4,940	$5,735	$5,822	$9,308	$9,473	$9,548	$9,607	$9,646	$9,683
Totals	**$3,336**	**$3,703**	**$4,940**	**$5,735**	**$5,822**	**$9,308**	**$9,473**	**$9,548**	**$9,607**	**$9,646**	**$9,683**

A. Work Description

With the continued move to clean energy and SCE's ongoing commitment to confront climate change through our Clean Power and Electrification Pathway,[26] SCE will continue to invest in technologies and capabilities to transform the way we operate as a business. Our goal is to fully utilize data and technology to improve decision making, manage risk proactively, and enhance customer offerings. In pursuit of this goal, SCE will build on the Digital and Process Transformation foundation that has been established over the last few years to further advance operational excellence efforts.

Digital and Process Transformation focuses on transforming the most critical processes through process analysis and user centered design, enabling business operations with digital solutions, and supported by advanced analytics for data driven decision making. This approach is aligned with the overall continuous improvement culture which is one of SCE's core values.

Central to this continuous improvement culture is a strong digital capability focused on business results/impact. From a technology perspective, it is imperative to know where digital tools are best deployed within a process and to be able to deliver those tools quickly. With this in mind, the priority areas for Digital and Process Transformation solutions include the development and implementation of

[25] Refer to WP SCE-06, Vol. 01, pp. 21-30 Digital and Process Transformation – Standard Workpapers.

[26] *See* Exhibit SCE-01, Policy Testimony.

software tools that leverage Digital & Mobile Solutions,[27] Advanced Analytics,[28] Robotic Process Automations,[29] and Emerging Technologies.[30] The team works closely with core IT to review software architecture, provide engineering best practices, and guide teams on technology strategy. This enables SCE to respond to digital trends and leverage technologies to address the needs of employees, contractors, and customers. The work of this team integrates these capabilities into work processes with the aim of substantial improvement on the effectiveness of business operations.

Digital business transformation is more than just deploying technology. Recognizing that the effort would be very challenging and require vast cross-functional coordination to address large end to end process improvement opportunities, SCE embedded processes, and user experience design capabilities into the team to specifically focus on these challenges. Our practice utilizes a Lean Six

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[27] Mobile applications are computer programs or software applications designed to run on a mobile device such as a smart phone, tablet, or watch. These applications stand in contrast to desktop applications which are designed to run on desktop computers, and web applications which run in a web browser, rather than directly on a mobile device. These applications can greatly increase productivity through their ease of use, availability on a device that can be easily carried around as well as leveraging capabilities from the device like GPS, location-based services, camera, and voice recognition.

[28] Advanced Analytics is the use of sophisticated techniques and software tools to examine data or content (beyond the capabilities of traditional business intelligence tools) to discover deeper insights, make predictions, or generate recommendations. Advanced Analytics techniques include those such as data/text mining, machine learning, artificial intelligence, pattern matching, forecasting, visualization systematic analysis, sentiment analysis, network and cluster analysis, multivariate statistics, graph analysis, simulation, complex event processing and neural networks.

[29] Robotic Process Automation (RPA) software is used to create a list of actions that automate the tasks that a user performs in a software application's front-end graphical user interface (GUI). Once created, this RPA code can then be run (either triggered manually by the user or automatically triggered) to repeat those tasks directly in the application's GUI, instead of having a user do it.

[30] Emerging technologies are technologies whose development, practical applications, or both, have not been fully realized. These technologies are generally new but also include older technologies that are successfully used in other industries and have the potential to be successfully utilized at SCE to meet business needs.

Sigma[31] approach with Design Thinking[32] and an Agile[33] digital delivery model, to deliver effective transformation capabilities to meet business needs.

Over the past four years, the team delivered solutions in the areas of mobile applications, robotic process automations, and advanced analytics, which span the functional areas of T&D field operations, Customer Service operations, and back-office operations. Each of these solutions contributed to risk buy-downs, quality improvements, customer satisfaction, and operational efficiency. The following table provides examples of several of the solutions delivered over the last four years.

[31] Lean is the systematic identification and removal of waste in processes and Six Sigma is a data-driven systematic methodology to reduce variation to meet customer needs. More information can be found at https://goleansixsigma.com/what-is-lean-six-sigma/ and https://asq.org/quality-resources/six-sigma.

[32] "Design Thinking" is a user-centered solution focused approach to understand user needs and design products and solutions to address those needs. It encompasses processes such as context analysis, problem finding and framing, ideation and solution generating, creative thinking, sketching and drawing, modelling and prototyping, testing and evaluating. The benefits of this method include avoiding wrong assumptions, the ability to identify technical constraints early on in the development phase, and the ability to "fail fast" and eliminate low value ideas.

[33] "Agile" methodology is a framework for solution development that anchors on integrated teamwork (business and IT working together), accountability, and an interactive process for frequent validation of the solution toward a well-defined goal. The Agile method can dramatically reduce delivery times by delivering parts of an overall solution in increments and foster the ability to "fail fast" and stop initiatives or parts of a solution that are not succeeding. The types of solutions in advanced analytics, automation, and mobile lend themselves to the agile methodology.

Table IV-3
Examples of Digital Technology and Process Transformation Activities

Category	Opportunity	Solution	Benefits
Outage Communication – Customer Crew Connect (C3) Application	Updates from field crews for estimated restoration times (ERTs) for electric outages were phoned into the T&D operations center to be manually entered into the Outage Management System (OMS) for communication to customers. This was a manual, error prone and time-consuming process.	Developed a mobile application for the iPhone that enables field crew foremen to update the ERT of an electric outage and this information gets sent directly into the SCE OMS for immediate communication to customers via the outage map on SCE.com, removing the manual processes.	When used to provide outage ERT updates to the Distribution Operations Center (DOC), the C3 app results in a higher customer satisfaction net score (6) vs when it is not used (-14). It has also delivered over 85% decrease in time to provide outage updates (compared to manual). The application is used for approximately 75% of outages with 800+ users, and over 70K outages worked in C3 thru Q3 2022.
T&D Overhead Distribution Asset Inspections (ODI) – Inspect App	The Distribution Ground inspection process still relied on paper maps and used an application on a tough book laptop in the truck to capture information after they inspected and came back to the truck. They also did not have the ability to capture additional information apart from the completed inspection and raising a notification if necessary.	Developed a mobile application for the iPad that enabled ODI inspectors to view the assets and work on a map on the device, digitally capture information while they are at the pole (due to lightweight form factor), enabled a digital survey to capture much more information about the asset as well as the capture of a set of standard pictures for each inspection, and the ability to view outstanding notifications for that asset as well as raise new notifications as appropriate right from the device and send those directly to SAP for action.	- 80%+ improvement in # of inspections completed from 3,000/day to 5,500-6,000/day. - Improved data quality, reduction of errors on paper forms through digital data capture - Eliminated the need for paper maps - Enabled status reporting on inspections
Vegetation Management - Arbora	There are multiple vegetation management programs (e.g., Hazard Tree, Routine, Non-routine) to plan, schedule, and conduct inspections and remediation. All of these run-on different applications to manage this work and there is a need for a single application to capture information consistently and to enable the ability to manage across all vegetation management work.	Single, scalable, and easy-to-use platform that allows SCE and our contract partners to more effectively coordinate and execute vegetation management work, supporting an improved operating model in optimizing activities across work stages to meet 100% of annual program performance goals and user satisfaction through improving work efficiency and usability.	Expected benefits starting in 2023: • Increase productivity: Improve field performance and efficiency • Reduce errors: Reduce rate of errors, manual work, and rework requirements • Enable coordination: Support cross-program planning and work execution • Improve reporting: Increase reporting speed and accuracy • Annual financial savings of $18M from 2024

Table IV-3 (Continued)
Examples of Digital Technology and Process Transformation Activities

Category	Opportunity	Solution	Benefits
T&D Digital Work Order Package - WorkIt	Field work order (WO) are a heavily paper based and manual process. The opportunity is to a streamline the work package to an end-to-end digital workflow. This includes digitizing the entire WO package (10 - 250+ individual pieces of paper) and automating the business process workflows for ~4,000 T&D users.	Developed is an easy-to-use digital application to manage field work order execution for assets across Distribution districts & regions and Transmission grids. WorkIt will: • Eliminate paper WO jackets for field asset work execution. • Provide digital WO package and control documents enabling workflow automation for all new Capital/O&M work: Project/ program, new business, meter and service, maintenance and inspection and emergent work. • Effectively manage and help track near-real-time updates/changes to the WO in scheduling, execution and closure via desktop/web-app and mobile iOS devices. • Create performance metrics and dashboards.	Expected benefits starting in 2023: • Optimized and standardized workflow and approval processes and post-job reconciliation across T&D, which will lead to less rework and time delays, resulting in ~ $6M direct cost savings. • Improved data quality and process efficiencies through reduction in manual data entry and integration with systems of record (ex. SAP, Click Schedule, etc.), reducing need for downstream data cleanup. • Ability to better track near-real-time WO progress and quality via operational tools, performance metrics and dashboards. • Enhanced documentation of field work including validation and before-and-after photos. • Unified technology platform minimizing reliance on paper WO packages.
T&D Small Tools	In each of the districts field crews would have to fill out a paper form when checking out small tools (e.g., gloves hammers, power drills) from the tool room. This manual process made it difficult to track and manage inventory.	Developed a Small Tools application for the iPad and deployed in each District tool room for the foremen and crew to log their check-out of small tools from the District office tools room, providing a digital record for tracking	- Tracking of tools issuance by individuals in case of Safety recalls. - Improved inventory management - $1-2m reduction in annual tool spend through better tracking and management

Table IV-3 (Continued)
Examples of Digital Technology and Process Transformation Activities

Category	Opportunity	Solution	Benefits
Robotic Process Automations	SCE, like many organizations, have processes across the organization that require manual repetitive work. These types of processes utilize people resources that are prone to human error, can be costly and can take more time to complete.	Enable and maintain the ability for the enterprise utilization of the UiPath Platform to accelerate and maximize the use of Robotics Process Automation (RPA) capabilities in support of our corporate focus. Provide the ability to automate processes to reduce errors, safety incidents, cost to operate and transactional cycle-time while increasing job satisfaction, productivity, customer experience and digital optimization	SCE has automated over 120 processes across the organization. Three examples of processes automated by the DPT team include: - For overhead distribution inspections, implemented an RPA bot to move images from a SharePoint folder to SCE Google cloud for analysis. Eliminated manual work for 40k+ images in 2022 and forecasting a similar number in 2023. Expected annual benefit of $400K - For pole management program, implemented an RPA to automate the creation of work orders. Eliminated manual work for ~24k work orders annually with an estimated savings of $550K annually. - In support of DF95 compliance requirement, implemented an RPA to automate the transfer of over 5k records collected each month in the field into SAP. Savings of over $500K in 2021 and ongoing annual benefits of over $850K.
Advanced Analytics	There continues to be a rapid expansion in the amount of data being collected across SCE operations. This created a need for SCE to improve the ability and speed to analyze this information for more robust data-driven decision making	Utilizing data science resources, leverage this increased amount of data and the capabilities of advanced analytics to develop algorithms (artificial intelligence, machine learning, predictive, prescriptive, etc.) for more efficient and effective decision making. The results will deliver improvements in safety, cost savings, reliability, and customer satisfaction across the enterprise.	Developed multiple computer vision algorithms in support of Distribution and Transmission inspects. These models run against photos captured of our above ground assets to identify issues in three areas; 1) quality of image captured (blur, vegetation obstructing the view of the asset, etc.), 2) accuracy of the data (validate geolocation against system of record, validate pole tag in the picture against the pole tag on the file), and 3) asset defect detection (ex. deteriorated crossarms, cracked insulators, foreign objects in transformers, etc.). We are running these algorithms against millions of images and advising the inspectors of the issues for their final validation.

B. Need for Activity

The Digital and Process Transformation activities support SCE's efforts to eliminate waste and improve operations by leveraging process re-engineering, user centered design, and digital technologies to address pressing issues for the business. At present, Digital and Process Transformation, in collaboration with the respective OUs and core IT, is working in the areas of T&D field, customer service and back-office functions. During this next GRC period, DPT expects to expand its products and solutions across the enterprise. Below are some of the areas we expect to evaluate innovative solutions for and deploy products solving business needs:

Transmission and Distribution – Connected worker (voice enabled, hands free, remote assist), autonomous robots (both ground and air), Advanced Analytics (computer vision, AI, predictive modeling) to improve inspections, mitigations, and overall work execution.

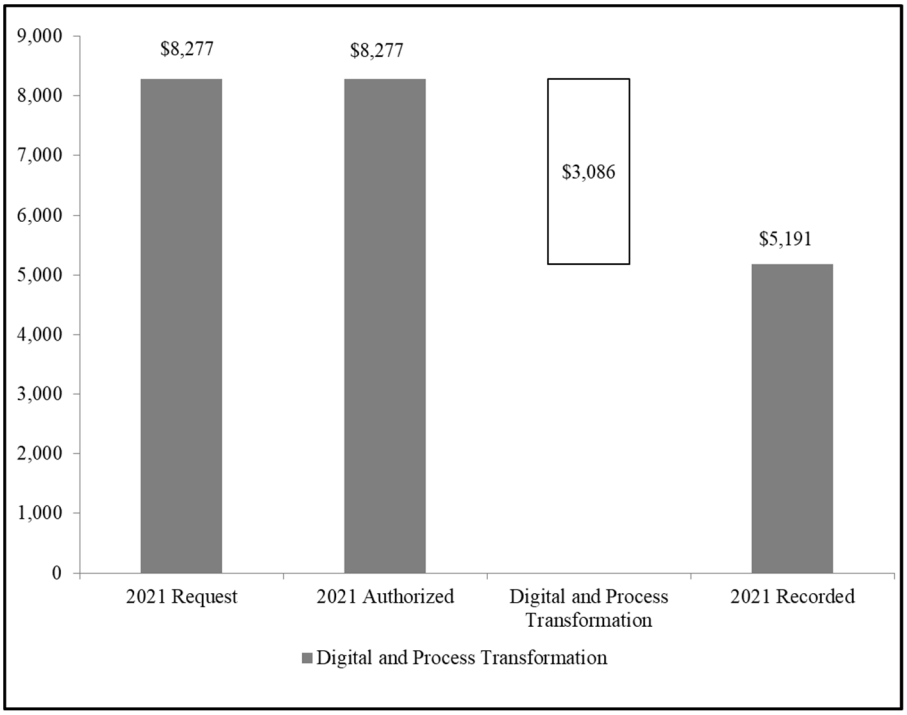
Customer Service – Call center analytics and prediction to proactively address customer needs before they contact the call center. Revenue Services organization analytics and prediction to reduce exceptions and improve overall performance and operations. This would include additional capabilities like process mining and robotic process automation, in addition to the advanced analytics.

Back Office – Virtual and augmented reality training to better simulate the experience for workers, robotic process automations to eliminate manual execution of back-office transactions, chat bots and conversational systems for higher self-service of questions and information, and natural language processing for analysis of unstructured data (documents) for adherence to and standardization of policies, contracts and procedures.

As illustrated by the examples above, the Digital and Process Transformation team will continue to address these types of evolving needs of the SCE business by utilizing process re-engineering, user centered design and digital technologies to find solutions to improve system reliability, customer service and risk mitigation.

C. Comparison of Authorized 2021 to Recorded – O&M

Figure IV-11
Digital & Process Transformation
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $000)



In 2021, Digital and Process Transformation recorded $5.191 million, which was under the authorized amount of $8.277 million in O&M.[34] In 2021, SCE continued to experience the global impacts of the COVID-19 pandemic. Therefore, SCE made necessary adjustments to normal operations and practices in an effort to mitigate the risk of COVID-19 transmittal and spread, and in order to comply with COVID-driven governmental directives and guidance. Some of these adjustments by SCE impacted, to a degree, our ability to rapidly fill open positions, as well as the scope of activities related to traveling for business travel, attending job-related or industry-related conferences, or engaging in normal levels of in-person training. As a result of the protocols that we necessarily adopted during the pandemic, the recorded expenses for this activity in 2021 were lower than authorized.

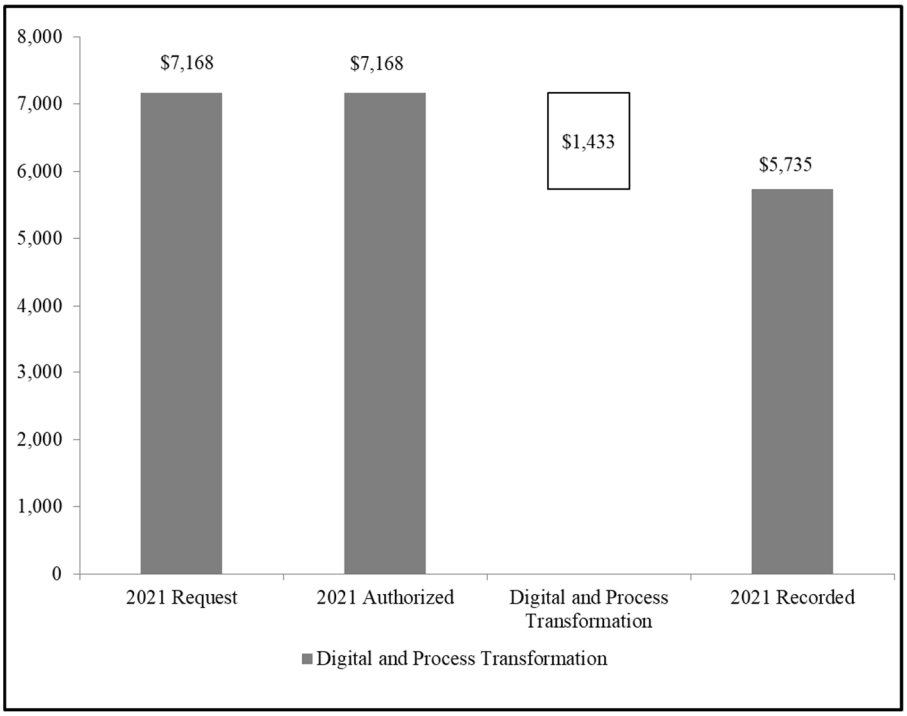
Additionally, an ongoing challenge to SCE's DPT workforce strategy is attracting and retaining data scientists, user interface designers, and mobile application developers. Identifying and hiring

[34] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

qualified candidates was prolonged, also driving the underrun. Lastly, an additional driver for the underspend from authorized was due to funds being re-allocated to other areas in SCE that were deemed a higher priority.

D. Comparison of Authorized 2021 to Recorded – Capital

Figure IV-12
Digital & Process Transformation
Comparison of 2021 Authorized versus Recorded Capital Expenditures
(Nominal $000)



In 2021, Digital and Process Transformation was authorized $7.168 million in Capital for Digital Accelerator (DA). This is compared to an actual spend of $5.735 million for DA which was $1.433 million under authorized.[35] This difference is due to transfer of funds into OU Capitalized Software in support of a joint implementation effort for a critical enterprise solution.[36]

[35] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

[36] $3.5 million was transferred from Digital & Process Transformation to Technology Solutions, in support of the WorkIt project. See Exhibit SCE-06, Vol. 02, for more details.

E. Scope and Forecast Analysis

Table IV-4
Digital & Process Transformation O&M Expenses[37]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$133	$3,681	$3,256	$2,872	$2,879	$4,667	$5,755	$9,989
Non-Labor	$774	$2,007	$2,150	$2,319	$1,419	$502	$570	$1,419
Other								
Total Expenses	**$908**	**$5,688**	**$5,405**	**$5,191**	**$4,298**	**$5,170**	**$6,325**	**$11,408**

1. Historical Variance Analysis

a) Labor

Digital and Process Transformation labor costs are allocated between O&M and Capital, in accordance with SCE's financial accounting policies.[38] In 2018, the DPT activity recorded $0.133 million in O&M labor expenses. DPT was only established in the second half of 2018, so there was not a full year of expenses nor a full team. In 2019, O&M labor expenses increased by $3.548 million driven by the staffing of the DPT team to the 35 employees required to execute the work described above. In 2020, O&M labor expenses decreased by $0.425 million due to a higher than projected charging of labor to capital work in accordance with SCE's financial accounting policies. In 2021, O&M labor expenses decreased by $0.384 million due to the move of six people from the Continuous Improvement team out of DPT, as well the attrition of several employees and the extended period of time that was required to backfill those positions. In 2022, the labor expenses remained at a similar level, which is attributable to regular attrition and timing of position backfills.

(1) Non-Labor

Like labor costs, non-labor costs for Digital and Process Transformation activities are allocated between Capital and O&M, in accordance with SCE's financial accounting policies. In 2018, the DPT activity recorded $0.774 million in O&M non-labor expenses. DPT was only established in the second half of 2018, so there was not a full year of expenses. In 2019, O&M non-labor expenses increased by $1.233 million, driven by the need for supplemental contingent workers to

[37] Refer to WP SCE-06, Vol. 01, pp. 21-30 Digital and Process Transformation – Standard Workpapers.

[38] The allocations are based upon the activities performed by each group in accordance with SCE's financial accounting policies.

augment our SCE workforce, as well as some strategy consulting contracts required to execute the work described above. Once again, in 2020, O&M non-labor expenses increased by $0.143 million due to additional supplemental contingent workers needed to augment SCE labor. And again, in 2021, O&M non-labor expenses increased by a nominal $0.169 million due to the addition of supplemental contingent workers to augment our SCE labor. In 2022, SCE is beginning to shift our strategy to build staffing capabilities in-house, which reduced our non-labor spend by $0.900 million to $1.419 million in 2022.

(2) Capital

Table IV-5
Summary of Digital & Process Transformation Capital Expenditures
Recorded 2018-2022 / Forecast 2023-2028
(Nominal $000)

	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Digital and Process Transformation	$3,336	$3,703	$4,940	$5,735	$5,822	$9,308	$9,473	$9,548	$9,607	$9,646	$9,683
Totals	**$3,336**	**$3,703**	**$4,940**	**$5,735**	**$5,822**	**$9,308**	**$9,473**	**$9,548**	**$9,607**	**$9,646**	**$9,683**

Capital expenditures in Digital & Process Transformation included projects costs such as contract labor costs for software development, software tool purchases and accompanying prepaid maintenance, tool implementation costs, and hardware costs. As described in the labor and non-labor variance explanations above, DPT was only established in the second half of 2018, so there was not a full year of expenditures. Since then, capital expenditures in 2018-2022 have been increasing steadily as the demand for projects within DPT increased. For examples of capital projects executed in the historical period, please see Table IV-3 "Examples of Digital Technology and Process Transformation Activities" above.

b) Basis for Forecast

(1) Labor

For Test Year 2025, SCE forecasts labor costs for Digital and Process Transformation activities based on an allocation of staff resources between O&M and Capital in accordance with SCE's financial accounting policies. As shown in Table IV-4, the O&M labor portion for 2025 is forecasted at $9.989 million and is an increase from 2022 recorded of $2.879 million. This increase is needed for additional staffing required to meet the demand forecasted, as well as additional investments for new technology prototypes targeted at improving speed and quality of field and back-office operations, reducing risk, and improving decision making through greater use of advanced

analytics. In addition, these O&M increases include a higher percentage of O&M versus Capital spend to account for prototyping new technology solutions, some of which may not be able to be capitalized because it will not result in a used and useful asset. Current examples of this include the evaluation of technologies such as Block Chain,[39] Generative AI,[40] and Digital Twins.[41] To reflect this level of growth, SCE utilized last recorded year plus adjustment methodology based on the forecast level of staffing necessary to support the volume of initiatives that will be undertaken in 2025. To meet this upcoming demand, we have updated some of our practices to attract talent, and the current trends in the labor market show more availability for the types of positions we are looking for in DPT.

We expect continued high demand for these capabilities, and as such the labor forecast[42] includes increases of 20%, 15% and 14% for 2026, 2027, and 2028 respectively, year over year. Consequently, these 2026-2028 increases have been normalized and adjusted[43] into the Test-Year 2025 forecast of $9.989 million for ratemaking purposes. Please see workpaper [44] for the details of the labor increases.

(2) Non-Labor

For Test Year 2025, SCE forecasts non-labor costs for Digital and Process Transformation activities based on an allocation between O&M and Capital, which reflects what is needed to meet projected demand as well as additional investments for new technology prototypes as discussed above. Although the demand for DPT projects will continue to increase, utilizing a last year

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[39] Block Chain is a decentralized, distributed digital ledger that records transactions in a secure and transparent way. It uses cryptography to ensure the integrity of the data and to prevent tampering, and it is maintained by a network of computers around the world rather than a single central authority.

[40] Generative AI refers to a type of artificial intelligence that is capable of creating new content or data based on input data or parameters. This is in contrast to other types of AI, such as discriminative AI, which focuses on classification tasks, or predictive AI, which makes predictions based on existing data.

[41] A Digital Twin is a virtual representation of a physical object or system that allows for simulation, monitoring, and optimization of its performance. It is created by collecting and integrating data from sensors, cameras, and other sources, and then using this data to create a computerized model that can be manipulated and analyzed.

[42] The forecast also incorporates an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol. 04.

[43] Calculation of normalization amount is as follows: [2025 amount of 8,518 + 2026 amount of 9,478 + 2027 amount of 10,572+ 2028 amount of 11,749] /4= the updated 2025 normalized amount of **$9,989**. Dollars are in constant and in '000.

[44] Refer to WP SCE-06, Vol. 01, pp. 31-35 - Digital and Process Transformation Labor and WP SCE-06, Vol. 01, pp. 36-39 - Digital and Process Transformation GRC Summary.

recorded forecasting methodology of $1.419 million to arrive at the Test Year 2025 forecast of $1.419 million is an appropriate basis as we expect to keep non-labor costs down for consultants as we build staffing capabilities in-house.

(3) Capital

Table IV-5 shows the Digital & Process Transformation capital forecast is $9.308 million for 2023, with only 2% year-over-year increase between 2023-2028. As stated in the Historical Variance Analysis section above, capital expenditures in Digital & Process Transformation include project costs such as SCE labor, contract labor costs for software development, software tool purchases and accompanying prepaid maintenance, tool implementation costs, and hardware costs. These costs are necessary to execute digital application solutions, advanced analytics, robotic process automations and emerging technology prototypes based on the forecasted demand for each year. Solution planning, development, and implementation work for Digital & Process Transformation will include targeted digital solutions (excluded from the capital software project portfolio) to meet specific capability needs for the business, as well as multiple technology solutions packaged together in support of end-to-end process transformations. As a result, we anticipate significant capital investment towards the development of these solutions to meet business demands. For example, as described in the "Need for Activity" section, DPT expects to expand its products and solutions across the enterprise with examples such as call center analytics and prediction, virtual and augmented reality training, and autonomous robots (both ground and air) to improve inspections, mitigations, and overall work execution.

Similar to O&M labor and non-labor, these costs are estimated based on an allocation between O&M and Capital in accordance with SCE's financial accounting policies. SCE estimated these expenditures based on the level of staffing necessary to support the volume of initiatives that will be undertaken. SCE's estimation is also derived from industry benchmarks and historical costs from similar technology work components implemented by SCE, as applicable.[45]

[45] Refer to WP SCE-06, Vol. 01, pp. 36-39 - Digital and Process Transformation GRC Summary.

V.

SERVICE MANAGEMENT OFFICE & OPERATIONS

SCE's Service Management Office and Operations (SMOO) is the organization within IT focused on optimizing and transforming the delivery of managed services by IT's Managed Service Providers (MSPs). SCE transitioned to managed services in 2015. Since then, SMOO successfully stabilized this transition and is now positioned to optimize the delivery of managed services and thereby transform the value of IT Operations through higher MSP performance.

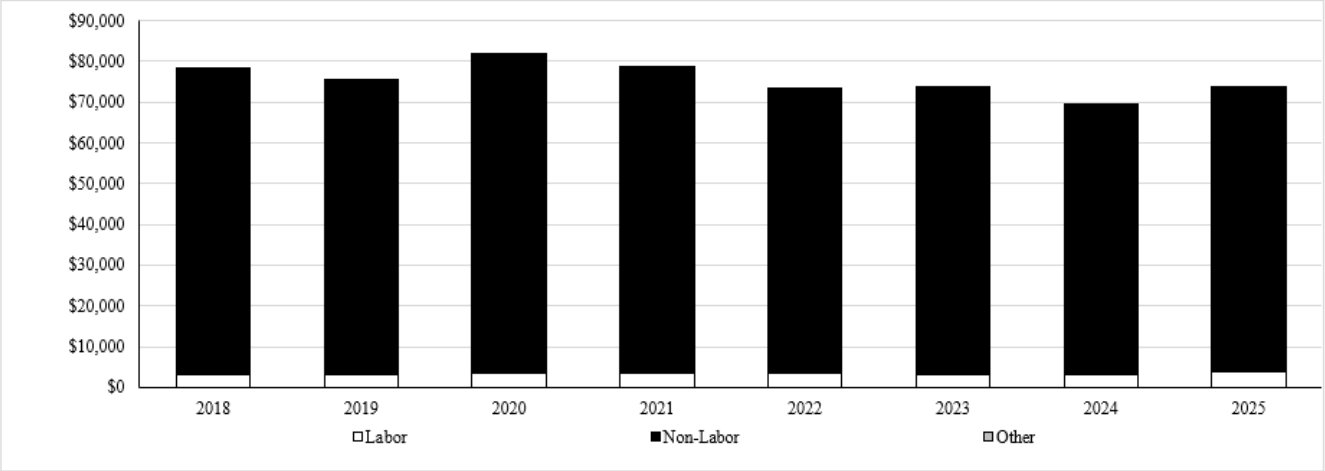
Services transformation and optimization are central to IT's ongoing modernization initiative in the following domains: 1) software application development and maintenance; 2) planning, designing, building and operating IT infrastructure; 3) managing and delivering End User Computing (EUC) services; 4) managing and delivering testing services; and 5) overseeing and managing SCE IT Service Management framework.

SMOO is driving and delivering modernization through technology digitization and process automation. To accomplish this goal, various tools and software platforms have been enabled and implemented, including the adoption of cloud solutions. Coupled with SCE's technology upgrades is the adoption and wide utilization of the DevOps delivery framework which delivers minimum viable products (MVPs) for projects in much shorter timeframes.

A. Fixed Price Technology & Maintenance

Figure V-13 provides 2018-2022 recorded and 2023-2025 forecast O&M expenses, broken down by labor and non-labor, for the Fixed Price Technology & Maintenance work activity.

Figure V-13
Fixed Price Technology & Maintenance O&M Expenses[46]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$3,135	$3,246	$3,550	$3,402	$3,495	$3,267	$3,297	$3,767
Non-Labor	$75,243	$72,318	$78,295	$75,351	$69,796	$70,350	$66,210	$70,087
Other								
Total Expenses	**$78,378**	**$75,564**	**$81,845**	**$78,753**	**$73,291**	**$73,617**	**$69,507**	**$73,855**

1. Work Description

Two incumbent MSPs deliver the scope of services included in the Fixed Price Technology and Maintenance work activity performed by IT. This scope of services is not only including the maintenance of our existing portfolio, but also now aimed at modernizing SCE IT infrastructure and platforms, digitizing services delivery to reduce cost and optimize processes, and transitioning to the DevOps project delivery framework for faster value realization. Included in this scope of services are the following: 24x7 Service Desk support, maintenance and support for 16,000+ end user laptops and desktops, support/development/testing for 800+ applications, management of three enterprise data centers (including compute, communication and network infrastructure), application and infrastructure support and maintenance for CSRP, and all IT Service Management (ITSM) functions.

[46] Refer to WP SCE-06, Vol. 01, pp. 40-46 - Fixed Price Technology and Maintenance – Standard O&M Workpapers.

The work functions performed by the MSPs will continue into Test Year 2025, and is augmented by three related SCE labor functions:

IT Service Management (ITSM) - The life cycle of IT Operations includes planning, delivering and running IT processes based on the Information Technology Infrastructure Library (ITIL) framework, which include process such as Incident, Problem, Major Incident, Change and Release, Testing, Knowledge, Continual Service Improvement, IT General Controls and Audits. Governing the execution of these processes, which is critical to the ongoing stability and value delivery of IT Operations, is the function of IT Service Management (ITSM). With the stabilization of the ITSM function, SCE is now focused on optimizing outcomes through tighter service integration across multiple delivery partners, consistent with the company's core value of continuous improvement. This function also enables adoption of DevOps framework and digitization of ITIL processes. Managing the performance and outcomes of this critical function is a dedicated SCE staff.

Sourcing – This function governs the IT sourcing strategy for all project work outside the defined MSP scope of services. Development of negotiated project contractual obligations in the form of Statements of Work (SOW) for projects across all SCE OUs is its key deliverable.

Service Provider Management Office (SPMO) – With the shift in IT from stabilizing the delivery of MSP services to transforming services delivery and optimizing business outcomes, the functions performed by this office have accordingly evolved since 2015. Though still dedicated to contractual performance and MSP compliance, SPMO's focus now includes delivering higher performance through integrated Business Service Level Agreements, measured across both MSPs. The contractual tools used to deliver the IT and business outcomes for SCE includes Service Level Agreement (SLA) adherence, root cause analysis, contract compliance, financial management, performance management, and continuous improvement. Supporting this office is a combination of both dedicated and matrixed SCE labor to manage each of the MSP towers: infrastructure, SAP application and maintenance, non-SAP applications and maintenance, end user computing, Service Desk, and IT service management.

2. <u>Need for Activity</u>

The Fixed Price Technology and Maintenance activity is necessary to perform day-to-day IT functions for the entire IT enterprise. SCE benefits from this model as it provides a standardized service delivery and performance approach that is also flexible and scalable to respond to SCE's dynamic business needs. Because our selected MSPs have a significant level of experience in delivering

common and repeatable IT services and support functions, using MSPs for these activities enables SCE to react faster, be more effective, and continually improve on support and service levels. This model reduces operational risks, minimizes IT-related business disruptions, and reduces associated business disruption costs, all contributing to SCE's core goals of Customer Satisfaction, Affordability, Reliability, Safety, and Quality. SCE has extensive contractual terms and conditions built into our MSP partnerships to provide SCE with the ability to drive performance and manage risk. By driving consistently higher performance from our MSPs, SCE derives capacity to absorb new services into IT Operations without increasing costs proportionally. SCE also maintains strong governance and oversight of all MSP contractual SLAs in order to maintain the committed contractual performance levels. This allows SCE to shift risk away from SCE and our customers. Ultimately, this model enables SCE to achieve a lower cost structure for IT services and to continue to mature IT operating capabilities. Savings achieved through combining all these operational functions under two MSPs provides economies of scale enough to partially absorb the growing demand for IT services and technologies. For instance, we will continue to provide critical support to large strategic programs such as Grid Modernization and Wildfire Mitigation. Additionally, IT services will support new strategic programs such as NextGen ERP,[47] IT Service Management Upgrade,[48] and Electric Asset Data (EAD)[49] at a reasonable cost by using the preset pricing provisions in our contract. Also, due to our contract, we have been able to implement IT Modernization and Simplification efforts and other new capabilities[50] without

[47] The SAP ERP solution at SCE is a comprehensive Enterprise Resource Planning system that performs several critical functions (e.g., asset management, financial recording and reporting, supply chain management) and provides necessary information to support SCE's core processes. The Next Gen Enterprise Resource Planning (ERP) Program is a complex technology implementation that will move our enterprise resource planning system from the current on-premise SAP Platform to the SAP S4/HANA cloud platform.

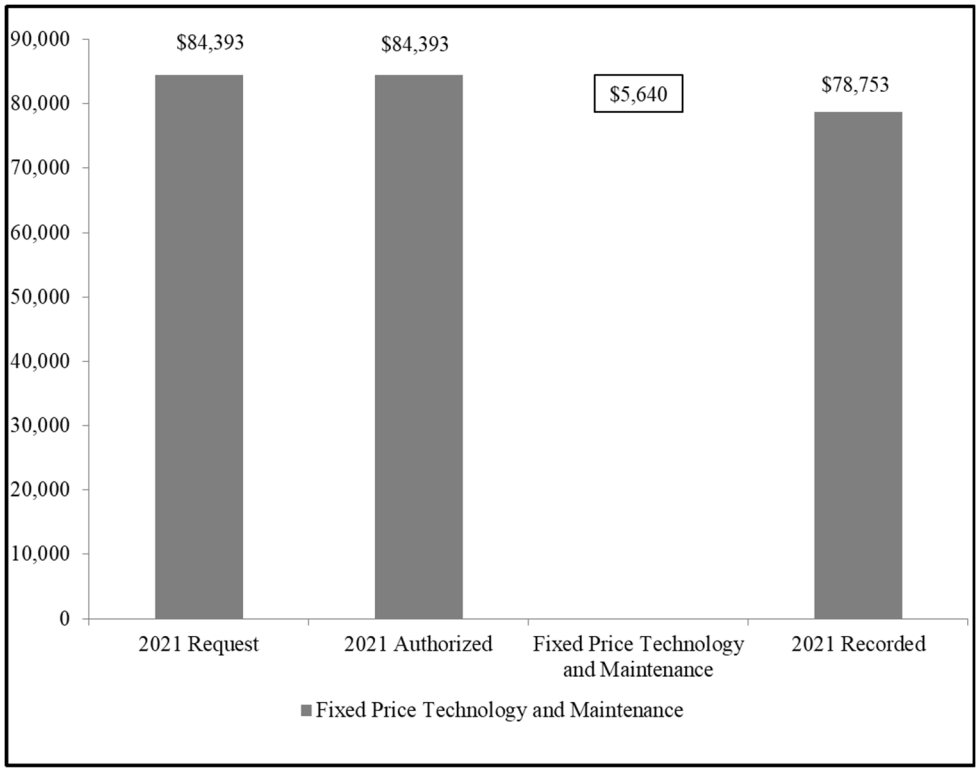
[48] BMC Remedy is deployed in SCE IT enterprise, Grid Services and HR EIC services as an IT Service Management "ITSM" ticket management, tracking MSP SLA, GRID changes and work management, and HR case manage solutions in HR EIC, Disability and Finance Payroll issue tracking.

[49] In 2021 SCE began its Electric Asset Data program to address the increasing need to better understand, monitor, mitigate and remediate the quality of critical electric asset data attributes stored within and across its systems of record (e.g., SAP) and systems of engagement (e.g., GE Smallworld, Map3D) that are relied upon to effectively manage and operate its electric assets. These data attributes include, but are not limited to, fields such as equipment type, make, model, material type, age, location and associated unique identifiers that link electric asset data across systems.

[50] *See S*ection V.A.4.1.2 Historical Variance Analysis: Non-Labor for additional capabilities added in our Gen II contract.

adding significant costs.[51] Alternatively, if we had to resource and support these new activities outside our MSP structure, we would have incurred a substantial O&M increase. This cost-saving point is reflected in SCE's relatively minimal test year forecast increase of $0.291 million from 2022 recorded.

Figure V-14
Fixed Price Technology & Maintenance
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $ Millions)



3. Comparison of Authorized 2021 to Recorded

SCE was authorized $84.393 million for Fixed Price Technology & Maintenance in the 2021 GRC. This work activity's recorded 2021 expenses were approximately $78.753 million, which was $5.640 million below authorized.[52] The underspend was primarily due to savings incurred through prudent negotiations that increased Digital capacity and Digital Platform Maintenance, without increasing costs, planned work that did not materialize in Application Development and Maintenance, and significant cost avoidance for new services in IT operations introduced as projects transition from

[51] Refer to Section I.C.1. Enterprise Technology Focus and Operational Improvements.

[52] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

development to maintenance. The planned Application Development and Maintenance work is still anticipated to be performed in 2025 and beyond. In addition, due to rationalization and consolidation in IT infrastructure, the volume of resources consumed and invoiced was lower than planned, resulting in savings in infrastructure towers.

4. Scope and Forecast Analysis

Table V-6
Fixed Price Technology & Maintenance O&M Expenses[53]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$3,135	$3,246	$3,550	$3,402	$3,495	$3,267	$3,297	$3,767
Non-Labor	$75,243	$72,318	$78,295	$75,351	$69,796	$70,350	$66,210	$70,087
Other								
Total Expenses	**$78,378**	**$75,564**	**$81,845**	**$78,753**	**$73,291**	**$73,617**	**$69,507**	**$73,855**

a) Historical Variance Analysis

(1) Labor

The labor costs for Fixed Price Technology and Maintenance represent SCE employees who manage IT Service Management (ITSM), Sourcing and Service Provider Management Office (SPMO) functions within SMOO. As illustrated in Table V-6, labor expenses remained relatively consistent from 2018 to 2022 with minimal variability due to attrition of employees and timing of position re-staffing. 2022 labor costs also include a transfer of three additional SCE full-time employees to perform management and operations of IT general controls and IT SOX controls, which were previously housed by IT Cybersecurity and Compliance.

(2) Non-Labor

In 2018, SCE was under the first generation (Gen I) contract which resulted in historical dollars of $75.243 million. July 2019 marked the transition from the first generation (Gen I) of our MSP contract to the second generation (Gen II) MSP contract in which the scope of services increased significantly. Beginning in July 2019, Gen II added the following services:

[53] Refer to WP SCE-06, Vol. 01, pp. 40-46 - Fixed Price Technology and Maintenance – Standard O&M Workpapers.

Cloud Computing Operations,[54] Digital Governance Operations & Digital Platform Services,[55] Integration Center of Excellence Service,[56] Service Integration and Management,[57] Software Quality Assurance Services,[58] New SAP Customer Service,[59] and Grid Modernization services.[60] While the overall annualized contractual cost from Gen I to Gen II remained flat at approximately $75.3 million, the recorded variance between 2019 and 2020 reflects July to December 2019 adjustments of $2.6 million to the contract that were annualized and billed in 2020. In 2021, the billed adjustment did not take place, therefore the recorded dollars of $75.351 million reflected the flat Gen II contract rate.

For 2022, the decreased recorded cost of $69.796 million reflects rationalization and consolidation in infrastructure services, which were driven by lower consumptions of resources in the domains of Data Center, Networking Technology and End User Computing.[61]

b) Basis of Forecast

(1) Labor

As shown in Table V-6, SCE's 2025 O&M Test Year Forecast for labor is $3.767 million, an increase of $0.273 million from the 2022 recorded labor amount of $3.495 million. SCE will continue to require SCE labor in 2025 to manage IT Service Management (ITSM), Sourcing, and Service Provider Management Office (SPMO) functions related to the MSPs. From 2018-2022, labor costs experienced minimal variability due to attrition and staffing of existing employee roles.

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54 Providing cloud computing expertise for all phases of management, operation, and maintenance of SCE's multi-provider cloud environment.

55 Providing digital thought leadership and capabilities in governance, process, and technology to drive continuous improvement in SCE's digital maturity and establish IT-wide best practices digital platform policies, processes, and procedures.

56 Providing Application System integration capabilities to support SCE's digital transformation needs and optimize integration costs.

57 Streamlining management of multiple managed service providers and drive MSP integration for end-to-end services and improved business outcomes.

58 Establishing best methodologies for IT-wide multi-modal software quality assurance and testing to improve end-to-end business assurance by aligning solutions with business needs.

59 Providing services for the Customer Service platform (SAP) provides new capabilities to enhance the end-user experience for all support groups, while utilizing existing tools to ensure continuity.

60 Portfolio of Grid modernization applications and infrastructure supported by service providers to improve grid resiliency.

61 Includes CSRP realized benefits of approximately $123,000 in 2021 and approximately $713,000 in 2022 (constant $). Please refer to SCE-03, Vol. 01 for discussion on CSRP benefits.

Therefore, SCE utilizes the last year recorded estimating methodology plus an adjustment to form the basis of our Test Year Forecast. This is consistent with Commission guidance to use the last recorded year when historical recorded costs exhibit a trend in one direction over three or more years.

The adjustment is due to the need for an additional three SCE FTEs to perform management and operations of IT general controls and IT SOX controls, which were previously housed by IT Cybersecurity and Compliance (as described in the Historical Variance Analysis section above). The transfer of the FTEs took place in the latter half of 2022, and so the total labor costs for these FTEs are not reflected in 2022 recorded numbers. Starting in 2023, these three FTEs will be fully recording to the Fixed Price Technology & Maintenance activity.[62]

(2) Non-Labor

As shown in Table V-6, the non-labor forecast for the 2025 Test Year is $70.087 million,[63] a small increase of $0.291 million from 2022 recorded, and is based upon the agreed contractual MSP pricing that will be required in order to support our operations. The minimal increase is due to the incremental cost to continue supporting major inflight strategic programs such as Grid Modernization and Wildfire Mitigation, new strategic programs such as NextGen ERP, IT Service Management Upgrade, Electric Asset Data, ISU Upgrade, and service additions attributable to many smaller projects that will also be transitioning to production. The amount attributable to the individual MSP service areas impacted by these additions is further defined in the detailed workpapers.

B. Software Maintenance & Replacement

Figure V-15 and Table V-7 provide 2018-2022 recorded and 2023-2025 forecast O&M expenses, broken down by labor and non-labor, for the Software Maintenance & Replacement work activity and by sub-work activities.

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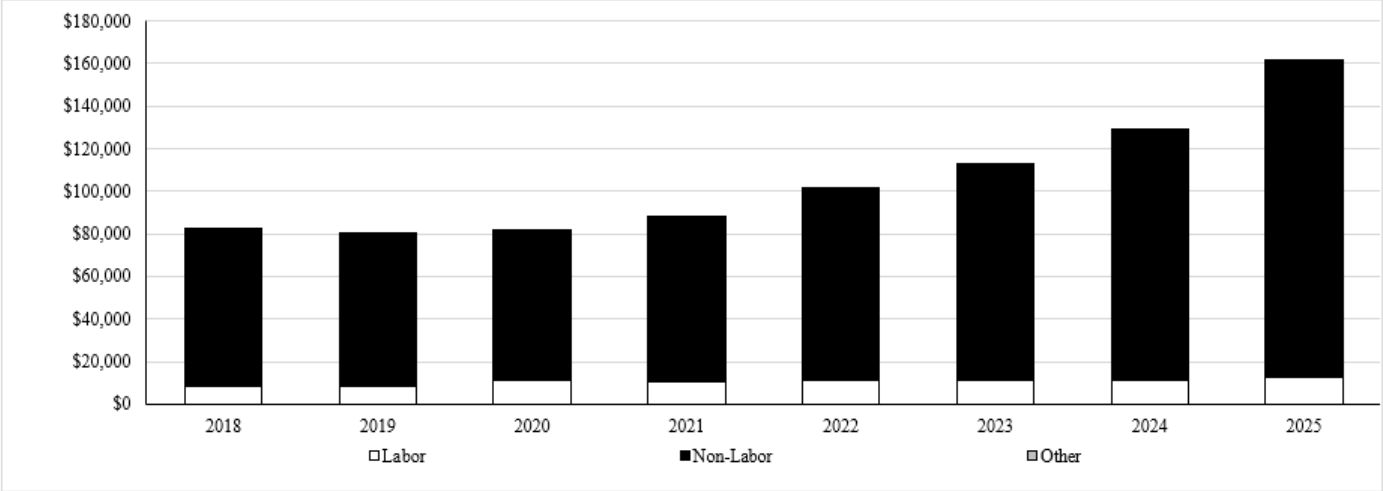
62 Note that $0.2 million of the increase in 2025 is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. See Exhibit SCE-06, Vol. 04.

63 This is a normalized forecast. Calculation of normalization amount is as follows: [2025 amount of 71,652 + 2026 amount of 70,599 + 2027 amount of 69,561 + 2028 amount of 68,538] /4= the updated 2025 normalized amount of **$70,087**. Dollars are in constant and in '000. Refer to WP SCE-06, Vol. 01, pp. 47-48 - GRC MSP Cost Breakdown.

Figure V-15
Software Maintenance & Replacement O&M Expenses[64]
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$8,040	$8,544	$11,425	$10,692	$11,149	$11,108	$11,382	$12,944
Non-Labor	$74,466	$71,635	$70,694	$77,506	$90,651	$101,631	$118,005	$148,512
Other								
Total Expenses	**$82,506**	**$80,179**	**$82,119**	**$88,199**	**$101,800**	**$112,739**	**$129,388**	**$161,456**

Table V-7
Software Maintenance & Replacement O&M Expenses by Sub Work Activity
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Application Refresh	$12,181	$12,757	$15,061	$15,267	$25,091	$23,562	$23,477	$36,158
Cloud (Subscription Based Software)	$18,822	$25,002	$28,108	$36,491	$39,861	$43,307	$50,327	$57,010
Perpetual License	$51,503	$40,898	$38,643	$36,253	$36,825	$45,870	$55,584	$68,288
Software Maintenance & Replacement		$1,522	$307	$187	$22			
Software as a Service (SAAS)	$	$		($1)				
Totals	**$82,506**	**$80,179**	**$82,119**	**$88,199**	**$101,800**	**$112,739**	**$129,388**	**$161,456**

[64] Refer to WP SCE-06, Vol. 01, pp. 49-61 - Software Maintenance and Replacement – Standard Workpapers.

Figure V-16 and Table V-8 provide 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Software Maintenance & Replacement work activity and by sub-work activities.

Figure V-16
Summary of Software Maintenance & Replacement Capital Expenditures
Recorded 2018-2022 / Forecast 2023-2028
(Nominal $000)

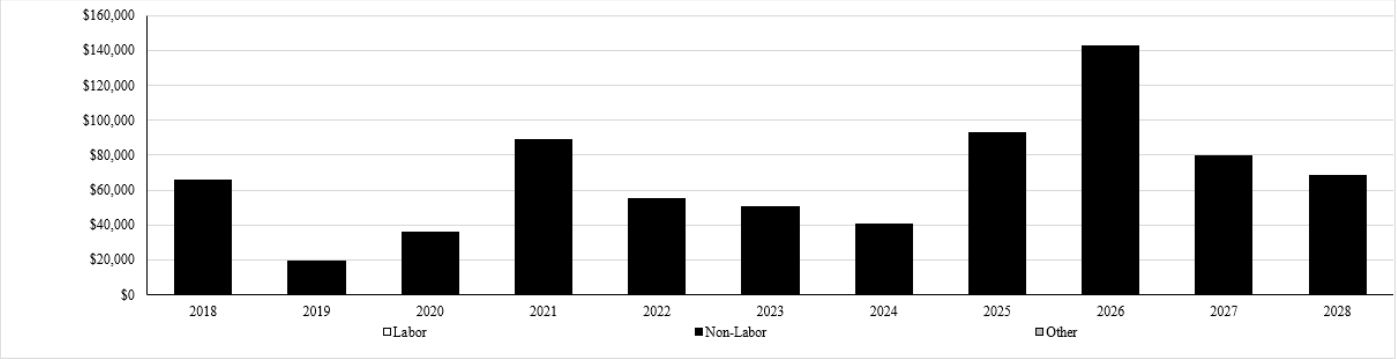


Table V-8
Software Maintenance & Replacement Capital Expenditures by Sub Work Activities
Recorded 2018-2022 / Forecast 2023-2028
(Nominal $000)

	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Application Refresh	$7,393	$8,199	$21,795	$20,491	$33,393	$43,589	$28,320	$58,201	$52,075	$70,080	$56,411
Perpetual License	$58,518	$10,901	$14,078	$68,092	$21,984	$6,656	$11,945	$34,602	$90,564	$9,375	$11,828
Totals	**$65,912**	**$19,100**	**$35,873**	**$88,583**	**$55,377**	**$50,245**	**$40,265**	**$92,803**	**$142,639**	**$79,455**	**$68,239**

1. Overview of Work Activity

The Software Maintenance and Replacement work activity includes costs required to maintain SCE's operating software assets through on-premise licenses, off-premise licenses (cloud), subscription, and maintenance contract agreements. This also includes refresh of the core Operating Software comprised of operating systems, business intelligence systems, database management systems, cross-system integration tools, IT monitoring tools, and end-user productivity and collaboration software which enable business applications enterprise wide to take advantage of the underlying hardware features and functions to deliver efficient and high-quality services to our customers. Lastly, this work activity includes application refresh activities, which consist of the management, upgrade, maintenance,

optimization, monitoring, and testing of about 700 existing IT business applications and more than 5,000 interfaces through their lifecycles.

This work is divided into four sub-work activities: (1) Perpetual License; (2) Software as a Service (SaaS); (3) Cloud; and (4) Application Refresh. Perpetual License, SaaS, and Cloud are written together below due to their interrelationship, with Application Refresh following.

The maintenance contracts portion of this forecast typically provides SCE access to break/fix support from the vendor, service patches, and minor and major upgrades for software products managed by IT. On-going maintenance and refresh of operating software are essential activities that preserve business applications and systems (e.g., monitoring/alerting utility operations, outage communication to customers, usage billing and reporting, and weather and safety considerations).

In the past, SCE has always ensured that the investments we undertake in this space are prudent and will continue to take cost cutting measures to keep costs down. In the historical period, we began to implement application rationalization efforts, aimed to simplifying our environment by reducing under -utilized applications, resulting in cost savings. On a consistent basis, during license negotiations, we take cost cutting measures such as entering into long term agreements to offset escalation and obtain discounted pricing. Additionally, we ensure that our pricing is validated against our peer utilities and request for competitive bids to execute on the lowest price possible. Lastly, we ensure the hygiene of our license environment by reviewing usage data and trouble tickets to continually look for opportunities to decommission[65] or scale down on our services, and therefore, costs. However, significant cost pressures have surpassed the savings that we have realized, which are preventing SCE from staying flat in this space.

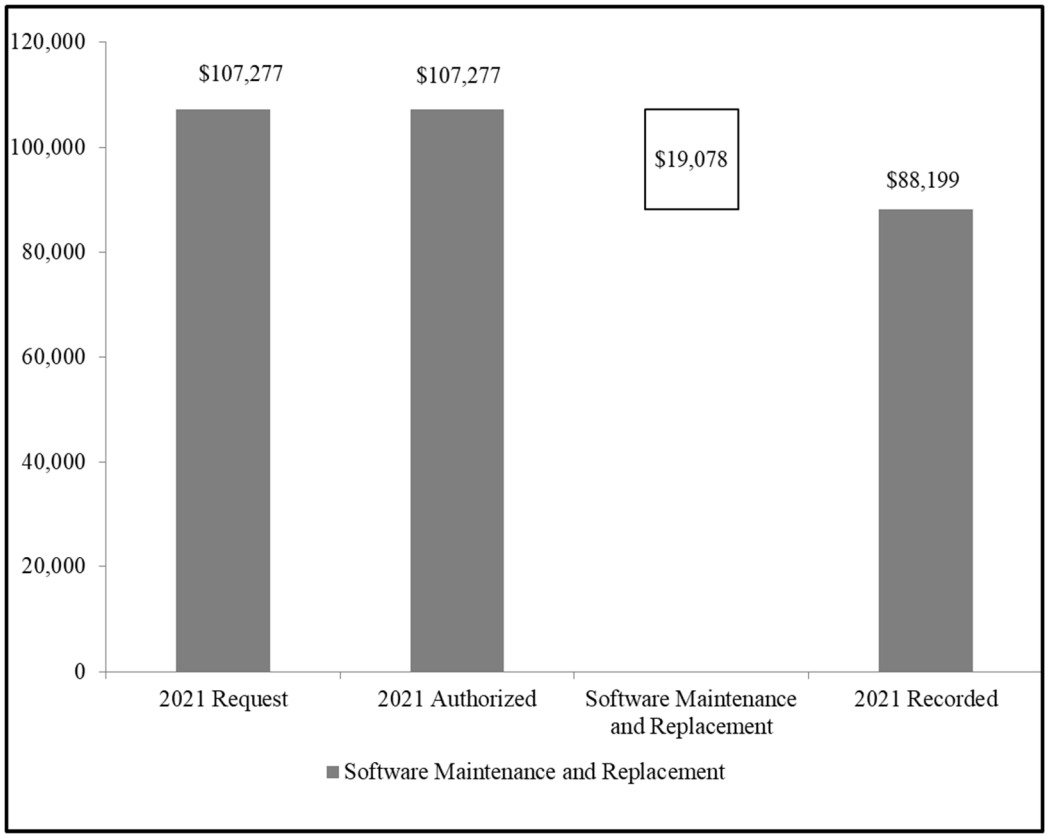
From the historical period, software maintenance & replacement is experiencing significant increases in our forecast due to: (1) growing business needs to digitize our environment and support SCE initiatives impactful to customer satisfaction, affordability, reliability, safety, and quality; and (2) movement to the cloud as most new functionalities are primarily not available on premises and related limitations on accounting rules. Further discussions on business drivers are described in the basis of forecast sections within our sub work activities.

[65] Decommissioning licenses happens when assessments show that these licenses are underutilized or when a system is being replaced.

Overall, the 2025 test year forecast is $161.456 million in O&M (constant 2022 dollars).[66] The forecast for this work activity also includes $473.646 million (nominal dollars) for 2023-2028 capital expenditures.

2. Comparison of Authorized 2021 to Recorded - O&M

Figure V-17
Software Maintenance & Replacement
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $000)



SCE was authorized $107.277 million in O&M expenses for Software Maintenance & Replacement in the 2021 GRC. This work activity's recorded 2021 O&M expenses were approximately $88.199 million, which was $19.078 million below authorized.[67]

[66] Calculation of normalization amount is as follows: [2025 amount of 144,796 + 2026 amount of 149,442 + 2027 amount of 151,650+ 2028 amount of 154,009] /4= the updated 2025 normalized amount of **$149,974**. Dollars are in constant and in '000. Refer to WP SCE-06, Vol. 01, pp. 62-63 - Software Maintenance & Replacement Normalization for detailed calculations.

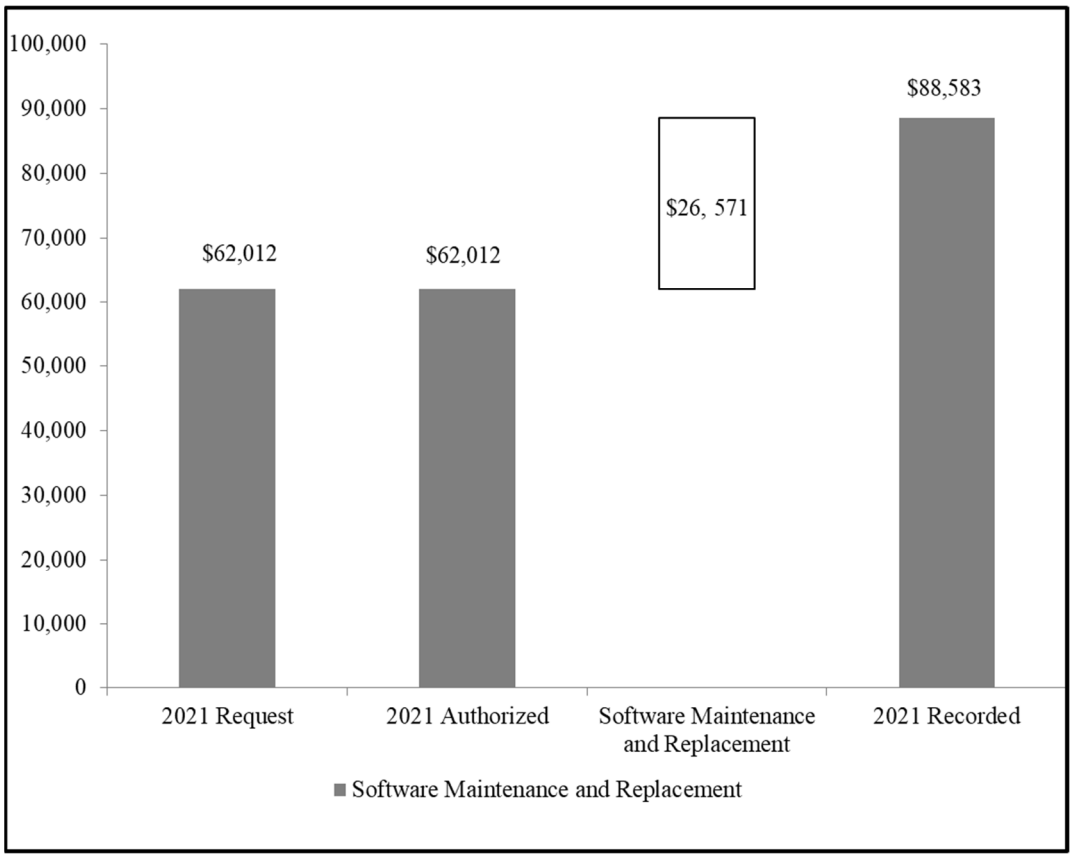
[67] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

Most of the software contracts under this work activity are typically renewed yearly. Yearly renewals allow SCE to make decisions to push for savings and decommission the use of the application and save on O&M as appropriate. Due to this continual assessment of our contracts, we are able to see this underspending for Cloud, SaaS, and Perpetual License sub activities. The underspend in year 2021 is due to three primary reasons: (1) maintenance cost reductions resulting from capital investments, (2) reductions resulting from moving IBM mainframe to third party support, (3) non-renewals of maintenance for decommissioned applications, and (4) prudent negotiations with vendors resulting in savings.

Within Application Refresh, the drivers of the lower than authorized spend are primarily normalization of O&M projects and Consulting & Professional services spend across three years resulting in underruns in earlier years and overruns in outer years. Other reasons include deferral and reprioritization of projects to 2022 and beyond due to CSRP program delays,[68] CSRP system freeze and delayed/deferred costs for third party support not provided by MSPs (e.g., Doble, Click, Primavera). This is offset by a slightly higher SCE labor/expenses costs resulting from resource transfers from the CSRP program back to operations, and establishment of a newly formed Engineering Services group.

[68] *See* A.21-07-009, Exhibit SCE-01 Direct Testimony in Support of Southern California Edison Company's Request for Authorization to Recover Costs Recorded in its CSRP Memorandum Account – Track 1.

Figure V-18
Software Maintenance & Replacement
Comparison of 2021 Authorized versus Recorded Capital Expenditures
(Nominal $000)



3. Comparison of Authorized 2021 to Recorded - Capital

SCE was authorized $62.012 million in capital expenditures for Software Maintenance & Replacement in the 2021 GRC. This work activity's recorded 2021 capital expenditures were approximately $88.583 million, which was $26.571 million above authorized.[69] This spending over authorized is primarily attributable to executing a major restructuring of our Microsoft portfolio at a cost of $45.0 million. Actual costs were approximately $16 million higher than 2019 original estimates. Within this re-structure, SCE purchased a completely new set of replacement products including five years of maintenance. This purchase allowed SCE to leverage new collaboration software that was important for replacing Cisco landline phones, Verizon Audio, and WebEx functionality at a superior

[69] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

price point, and included new features improving our telework capabilities and improving operational efficiencies. Additionally, this purchase captured increased capacity growth resulting from increased user counts due to wildfire mitigation and PSPS requirements, including license costs for contractor iPad users. More importantly, Microsoft provides additional security features for all Microsoft Office 365 users, especially ones related to increased mobile device usage.

There were also increased expenses due to unanticipated growth in project demand for Oracle Java licensing, VMware, and UiPath. VMware licenses were used to increase reliability, security, and efficiency within our grid service operations and enterprise environments by virtualizing the IT environment, whereby IT is now able to host multiple operating systems, security tools, and applications on a single physical server. Java licenses were used to help the development of applications for a wide range of computing platforms while UiPath helped IT automate platforms utilized by SCE in streamlining processes via automation of business tasks. In addition to providing reliability, security and efficiency in the environment, the investments for Java and VMware also allowed SCE to remain compliant with vendor requirements on license entitlements and lower O&M expenses by restructuring the purchases and avoiding list prices for the use of the software.

4. Sub-Work Activities

The Software Maintenance & Replacement activity consists of four sub-work activities: (1) Perpetual License; (2) Software as a Service (SaaS); (3) Cloud; and (4) Application Refresh. Perpetual License, SaaS, and Cloud are written together below due to their interrelationship, with Application Refresh following.

a) Perpetual License, Software as a Service (SaaS), and Cloud (Subscription-Based Software)

(1) Work Description

The Perpetual License, SaaS, and Cloud non-project related sub-activities include maintenance of SCE's existing IT operating software assets through on-premise licenses, off-premise licenses (cloud), subscriptions, and maintenance agreements. This, in turn, supports our OUs to ensure maintenance of their business applications. SCE manages over 700 contractual agreements with over 250 publishers,[70] which include:

- Access to subscription SaaS offerings;

[70] This is growth from the 2021 GRC, which depicted over 460 contractual agreements with over 250 publishers. See Exhibit SCE-06, Vol. 01., Part 1A, p. 32.

- Access to externally hosted (Cloud) computing platforms;
- Access to vendor break/fix support to ensure we are running error free programs;
- Version upgrades to ensure software currency and security; and
- Access to vendor updates to provide timely security remediations to protect against cyber threats.

A significant portion of the above agreements is key to the support of the migration to cloud. Movement to the cloud mitigates the impact of hardware and software obsolescence as most vendor offerings are already, or will be in the near future, limited to cloud-based solutions, while providing better reliability, scalability, agility, and significantly more software options to choose from.[71]

Specific examples of operating software for which SCE has support agreements ensuring the business services mentioned above are delivered include:

- Microsoft Server and Desktop Operating Systems and Database Software;
- RedHat and SUSE Linux Operating Systems;
- Oracle Database Software;
- VMware Virtualization Software;
- BMC and Dynatrace monitoring tools;
- Redwood for job scheduling;
- DevOps development and orchestration software; and
- SAP S/4HANA for complex in-memory data analytics.

Some examples of the business applications supported by the previously mentioned licensing, subscription, and maintenance agreements are:

- The SAP suite of enterprise applications used for Customer Service and Billing, Financials, Human Resources, and work management;
- The Microsoft Suite of O365 (now branded as "M365") provides collaboration and productivity tooling (Outlook, Word, Excel,

[71] *See* Section V.C.4.C Technology Adoption for a full discussion of the advantages of movement to the cloud and SCE's plan of cloud migration in the forecast years.

PowerPoint, and SharePoint), as well as InTune for Mobile Data Management and Data Loss Preventions for mobile devices;

- Success Factors cloud services for Human Resources applications;
- Autodesk subscription service for managing enterprise engineering drawings and related services; and
- Salesforce Software as a Service (SaaS) capability used as a foundational solution for SCE Vegetation Management, Distribution and Transmission Asset Inspections and Work Order Digitization and Workflow management.

Finally, this sub-work activity also includes refresh of the core Operating Software made up of operating systems, business intelligence systems, database management systems, cross-system integration tools, IT monitoring tools, and end-user productivity and collaboration software which enable business applications to take advantage of the underlying hardware features and functions. Operating system refreshes are generally cyclical/routine, small upgrades that would not be delivered by a project team and do not provide new business partner capabilities. These upgrades are important as it ensures the security and stability of the operating software. Without these upgrades, there can be potential delays of vendor application support, increased costs for versions no longer supported by vendors, and increased risk of cybersecurity breaches and outages, which can ultimately impact business applications.

(2) Need for Activity

Most IT software license management is centralized in this activity for technical, legal, and financial oversight and governance. The regular renewal of vendor maintenance contracts for our perpetually licensed products, as well as renewal of cloud and subscription agreements for our cloud and SaaS products, is necessary to ensure timely support in the event of critical system failures as well as uninterrupted access to cloud and SaaS offerings. Maintenance renewals provide security updates, defects, performance improvements, and support for operating system upgrades. The maintenance support costs here are summarized in the O&M cost section of this testimony. If SCE does not implement the maintenance inclusive of critical security patches, the security of customer data and critical system infrastructure could be at risk. For example, in 2021, there was a global security

flaw in the Log4j framework[72] allowing cybercriminals to compromise vulnerable systems with just a single malicious code injection. If SCE was not up to date with our maintenance agreements, we would have been impacted by this global security flaw, which would have allowed cyber criminals to take control of full systems in our environment. This activity also monitors system capacity and asset lifecycles (obsolescence), reducing risk to system reliability and business productivity. Centralizing this activity in IT helps us provide consistent service terms with the vendors and helps to minimize duplication of tools or services.

Operating System and other software products provide a stable and reliable foundational platform for SCE's critical business systems, and are required for the operation of servers, storage devices, customer call centers, and personal computers. These software products also provide automated collaboration and communications capabilities, automated Service Desk and systems management, and Data Center Infrastructure Management systems. As is the case with other IT assets, periodically these software products require full replacement as they reach the end of their useful life and have been fully depreciated. To provide optimal protection against security breaches, make use of improved features and functional improvements, and to minimize our O&M expenses, we plan to replace a number of these aging systems. If we neglect to replace these aging systems, SCE will lose access to vendor support and/or be forced to pay higher fees for extended support. Our plans for this GRC period include, but are not limited to, the capital expenditures needed to refresh the applications below that would otherwise become incremental O&M expenses if not refreshed:

- Microsoft Operating, Database, and End-user Productivity and Collaboration products in support of end user computing features and functionality;
- NetApp system and data backup software to improve and maintain application resiliency and reliability;
- Citrix platform, which is used to remotely connect to SCE applications in a safe and secure manner. Citrix is utilized heavily by offshore managed service providers to support SCE applications;
- Dynatrace monitoring software used by application and infrastructure administrators to monitor web and http traffic;

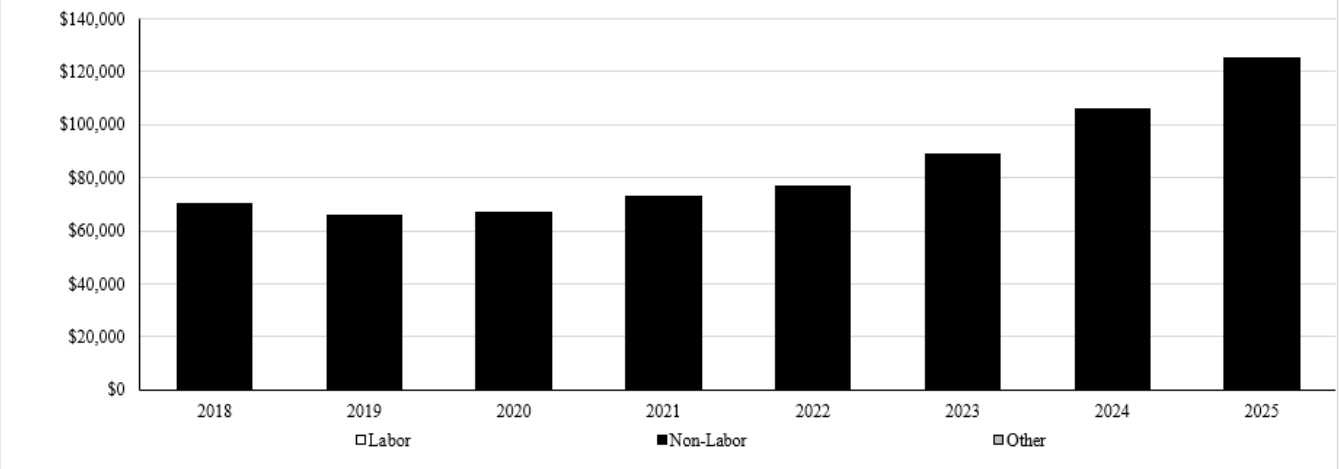
[72] *See* https://www.cisa.gov/news-events/news/apache-log4j-vulnerability-guidance.

- Redhat, a Linux operating system software, that provides the basic services within a computing system, used by infrastructure administrators to build most of our Linux based servers;
- Java, a software building platform used to develop application codes, used mainly by developers to build application capabilities; and
- Snowflake, a data cloud platform used by SCE data administrators to load business data and perform data analytics.

(3) Scope and Forecast Analysis

Figure V-19 provides 2018-2022 recorded, as well as 2023-2025 forecast, broken down by labor & non-labor, for Perpetual License, Software as a Service (SaaS), and Cloud sub-work activities.

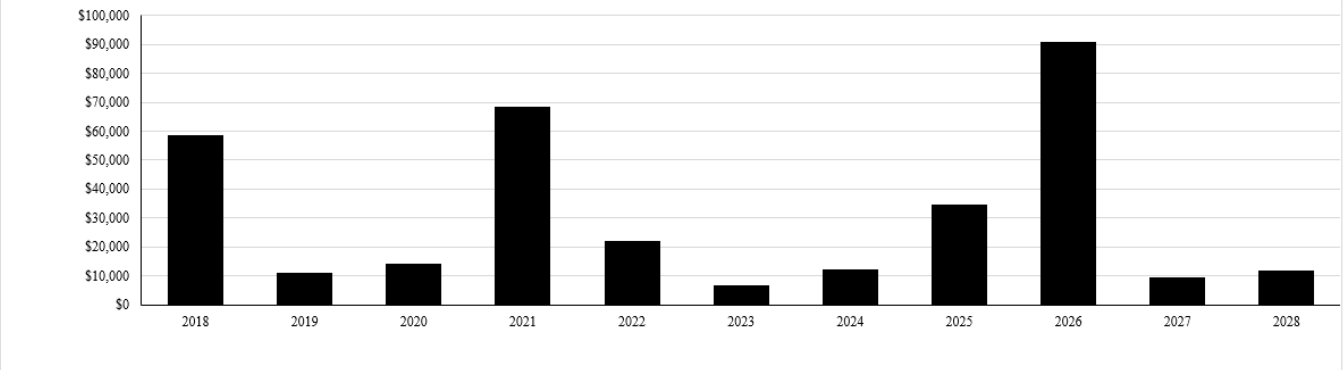
Figure V-19
Perpetual License, Software as a Service (SaaS), and Cloud O&M Expenses
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$111	$81	$207	$163	$285			
Non-Labor	$70,214	$65,819	$66,544	$72,581	$76,402	$89,177	$105,911	$125,298
Other								
Total Expenses	**$70,325**	**$65,900**	**$66,751**	**$72,744**	**$76,687**	**$89,177**	**$105,911**	**$125,298**

Figure V-20 provides 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Perpetual License, Software as a Services (SaaS), and Cloud sub-work activities.

Figure V-20
Perpetual License, Software as a Service (SaaS), and Cloud Capital Expenditures
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Perpetual License, Saas, and Cloud	$58,518	$10,901	$14,078	$68,092	$21,984	$6,656	$11,945	$34,602	$90,564	$9,375	$11,828
Totals	**$58,518**	**$10,901**	**$14,078**	**$68,092**	**$21,984**	**$6,656**	**$11,945**	**$34,602**	**$90,564**	**$9,375**	**$11,828**

(a) Historical Variance Analysis

(i) Labor (Perpetual License, Software as a Service (SaaS), and Cloud)

The minor labor changes from 2018 to 2022 reflects labor expenses from supply chain to process purchase orders. As noted in the forecast section, SCE does not forecast any labor costs for this activity.

(ii) Non-Labor (Perpetual License, Software as a Service (SaaS), Cloud)

The non-labor fluctuations in this account between 2018 and 2022 are due to changes in various license and maintenance agreements. Consistent with SCE's prior GRCs, the number and cost of license renewals varying from year to year is driven by licenses rolling off prepaid five-year maintenance from capital to O&M, the shift from perpetual licenses plus maintenance (capital) to subscription cloud-based models (O&M), and the need to renew new license agreements due to end of life. As stated above, SCE regularly measures usage to ensure we keep the costs down in this space. These are reflected in the increases from year to year in 2018-2022.

The non-labor decrease of $4.395 million from 2018 to 2019 is primarily a result of the 2018 capital investment that restructured the SAP portfolio, allowing SCE to prepay a portion of software maintenance. This SAP restructuring is primarily to take advantage of new functionality within the system. If we had not restructured this agreement, we would have seen a significant impact to the O&M spend (approximately $6 million per year) in 2018-2022.

The non-labor increase of $0.725 million from 2019 to 2020 is a result of capitalized investments transitioning to operationalized O&M costs as well as increases in capacity growth in user applications (Adobe Creative Cloud). The minimal increase in O&M non-labor costs is also attributable to a restructuring agreement with NetApp that saved approximately $800,000 per year.

The non-labor increase of $6.037 million from 2020 to 2021 is primarily associated with increased software costs due to the addition of $5.137 million for software maintenance costs previously covered under capital purchases (IBM, Veritas, CGI) and $0.9 million for increased growth in SaaS subscriptions (SAP Hybris Cloud).

The 2022 increase of $3.821 million in non-labor software costs was driven by, among other things, $4.0 million for software maintenance costs previously covered under capital purchases (HP, Copperleaf, SAS Institute, GE Energy) and other software costs including SaaS subscriptions (Adobe Creative Cloud, Okta). As mentioned previously, there is a continual effort to ensure decommissioning of obsolete licenses, which is also evidenced by $4.7 million savings for CSS mainframe licenses.[73]

(iii) Capital Expenditures (Perpetual License, Software as a Service (SaaS), and Cloud)

During 2018-2022, we made significant improvements to our software portfolio. We invested in new technologies, refreshed major suites of software with new and improved features and functions, and restructured our Enterprise SAP portfolio. These and other capital investments in our software portfolio provide the foundational computing platform for our business.

In 2018, we restructured our SAP portfolio at a cost of $47 million, which contributed to the overall historical cost of $58.518 million in 2018. Within this re-

[73] *See* Exhibit SCE-03, Vol. 01 for discussion on CSRP benefits.

structure, SCE purchased a completely new set of replacement products including five years of maintenance to take advantage of new and improved functionality within the system.

In 2019 we did not see the large restructure of enterprise portfolios that occurred in 2018, which resulted in a decrease of $47.617 million from 2018 to 2019. In 2019, the $10.901 million recorded cost was driven by, among other things, purchases of software from: (1) Dynatrace - $2 million in additional licenses including five years of maintenance; (2) Oracle licenses - $0.4 million for licenses and five years of maintenance; and (3) Microsoft Audio Conferencing and JAMF - $1 million for additional licenses and including five years of maintenance.

The increase of $3.177 million from 2019 to 2020 was driven by mostly purchases of software from: (1) Citrix - $3.4 million in licenses and five years of maintenance; (2) Dynatrace - $1 million in additional licenses including five years of maintenance; and (3) Octane licenses - $1.3 million for licenses and five years of maintenance.

In 2021, the non-labor increase of $54.014 million was driven by an investment of $45.0 million in Microsoft Suite "M365." With the purchase of M365, SCE was provided additional collaboration and productivity tools utilized by all of SCE (Outlook, Word, Excel, PowerPoint, and SharePoint), as well as increased security and operational efficiencies.

In 2022, we did not see the large restructure of enterprise portfolios which resulted in a decrease of $46.108 million from 2021 to 2022. In 2022, costs are primarily driven by purchases of software from (1) VMware - $7.7 million in licenses and five years of maintenance; and (2) BMC Helix - $5.2 million in licenses and five years of maintenance.

(b) Basis of Forecast

(i) Labor (Perpetual License, Software as a Service (SaaS), & Cloud)

There are no labor forecasts for these sub-work activities anticipated for the 2025 Test Year.

(ii) Non-Labor (Perpetual License, Software as a Service (SaaS), & Cloud))

Our Test Year forecast for non-labor O&M expenses, based on an itemized forecast, is $125.298 million (normalized).[74] Although we continue to take measures to

[74] Refer to WP SCE-06, Vol. 01, pp. 62-63 - Software Maintenance & Replacement Normalization for detailed calculations.

continually cut costs,[75] our non-labor software license maintenance and subscriptions costs are still forecast to grow due to several factors related to the initiatives SCE undertakes to address public safety, in addition to modernization of the grid, reliability, efficiency, and affordability business drivers. As SCE IT invests in new technologies (e.g., Salesforce, Palantir, UiPath) to address initiatives such as Wildfire and Grid Modernization, the ongoing costs required to support the implemented solutions will transition to operations and will result in increases in Software Maintenance & Replacement O&M once the solutions have been operationalized. Another example of an initiative executed that will impact our license environment significantly is the implementation of Salesforce, which will transform work order field management from paper-based, manual processes to a streamlined digital mobile platform for Distribution Districts, Regions, and Transmission Grids. Salesforce will also improve the overall electric asset data quality including those relating to Wildfire activities, process efficiencies, and process standardization through digitization. These digitization efforts added licenses to our environment, which will, in turn, drive our O&M cost increases.

Additionally, investments in future SCE IT applications will primarily be Software as a Service (SaaS) or Cloud (Subscription Based Software) based. Consumption-based services[76] is the growing market trend, as more and more new capabilities are available primarily through cloud services, and not on-premises as they used to be.[77] This shift in technologies is moving the spend from Capital to O&M due to current capitalization guidelines, which in turn contributes to the increasing O&M forecast. With on-premise application investments, SCE would normally capitalize the initial license purchase with five years of maintenance and once the asset was depreciated, SCE would normally restructure the application and recapitalize. With on-premise applications, the license acquisition is a one-time perpetual license purchase, where SCE purchases the license as a capital investment and continues paying the yearly O&M maintenance cost year-over-year as needed. The cost for the yearly O&M maintenance year over year was typically minimal. With the shift to SaaS and Cloud, there is no perpetual license purchased; instead the subscription payment model

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[75] The forecast also includes savings from optimization of SaaS Cloud products, which assesses our cloud subscription agreements and consolidates them where possible. This activity results in approximately $700,000 of savings in the 2025 Test Year and forward.

[76] SCE pays for services based on services consumed. The more services that SCE consumes, the higher the cost.

[77] *See* Section V.C.4.C Technology Adoption for a full discussion of advantages of movement to the cloud and SCE's plan of cloud migration in the forecast years.

includes software license and maintenance as one O&M cost. Thus, this results in a reduction forecasted in capitalized license purchases from 2027 and 2028 and increases in O&M in 2023-2028.

An example of an implemented business application that will continue to experience growth is Ariba. Ariba is a vendor management tool utilized to manage interactions with SCE's vendors through the entire procure to pay process, from negotiating costs through formal requests for purchase where many resellers are invited to bid on a purchase, to creating purchase orders and participating in early payment opportunities with suppliers to continue to achieve savings. Our plan in the forecast years is to migrate our vendors from on premise to the cloud, which will allow us to utilize new functionalities such as guided buying, which will transform our renewal process from manual spreadsheets to more automation, increasing efficiencies and drive for lower cost renewals. These new functionalities, however, are only available in the cloud, which increases our O&M license costs, as we are not able to capitalize subscriptions.

As described above, SCE IT faces many external challenges posed by market trends, growing business needs, and limitations with accounting rules, which are all contributing to the significant growth in our forecasts. Similar to historical non-labor, due to the variability in software license maintenance agreements and timing of renewals, an itemized forecast best represents the costs required for operational support of existing applications.[78]

(iii) Capital Expenditures (Perpetual License, Software as a Service (SaaS), & Cloud)

As mentioned previously, SCE continues to make significant improvements to our software portfolio with investments in new technologies, refreshing major suites of software with new and improved features, and restructuring of the portfolio. These and other capital investments in our software portfolio provide the foundational computing platform for our business. SCE plans to replace several end-of-life suites of software products through capital replacement projects. Refreshing end-of-life, fully depreciated licenses and maintenance with new replacement software licenses has the additional benefit of mitigating increases to O&M expenses. In other words, if these capital expenditures were not made, then there would be an increase in O&M expenditures to continue maintenance of these end-of-life software products.

[78] Refer to WP SCE-06, Vol. 01, pp. 1-71 - **Confidential** O&M Workpapers - Perpetual License SaaS Cloud.

Table V-9
Software Licenses
Forecast Capital Expenditures
2023-2028 Forecast
(Nominal $000)

Forecast					
2023	2024	2025	2026	2027	2028
$ 3,800,000	$ 2,038,198	$ 26,074,345	$ 79,482,455	$ -	$ -

- 2023: Forecast includes $3.800 million for the purchase of new licenses for tools and security products in IT environment, such as Redwood ($1.3 million), SailPoint ($1.0 million), OpenShift ($1.0 million) and HCI ($0.5 million).

- 2024: Forecast includes $2.038 million for the restructure of Dynatrace, a tool used for monitoring web and http traffic in the environment.

- 2025: Forecast includes $26.074 million for the restructure of UiPath ($3 million), Citrix ($5 million), IBM ($1.7 million), Redhat ($1.7 million) and Snowflake ($14 million), all with new functionalities and five-year maintenance contracts.
- 2026: We forecast $79.482 million for a refresh of the following technology: Microsoft ($60 million)[79], Java ($8 million), Veritas ($7 million) and Oracle ($2.8 million). Restructuring of these applications will result in new functionality and include licenses and five years of maintenance.

[79] Refer to WP SCE-06, Vol. 01, pp. 72-75 - **Confidential Workpaper-** Microsoft EA Renewal.

- 2027 & 2028: As stated in the non-labor section above, investments in future SCE IT applications will primarily be Software as a Service (SaaS) or Cloud (Subscription Based Software) based. With the transition to SaaS and Cloud and current capitalization guidelines, SCE will be unable to capitalize these costs, which results in a in $0 forecasted capitalized license purchases from 2027 and 2028 and increases in O&M from 2023-2028.

Table V-10
Operating Software and Middleware
Forecast Capital Expenditures
2023-2028 Forecast
(Nominal $000)

Forecast					
2023	2024	2025	2026	2027	2028
$ 2,856,187	$ 9,906,467	$ 8,528,008	$ 11,081,364	$ 9,375,300	$ 11,828,131

The 2023-2028 capital expenditures forecast for Perpetual License, SaaS, and Cloud also includes forecast expenditures of $53.575 million for Operating Software and Middleware, which are focused on the efforts for upgrading, configuring, and testing of operating software tools. The growth between the historical and forecast period is attributable to security features that were added as a result of our cloud transition[80] as follows:

- 2023 – Operating software category efforts include Oracle database upgrade to supported version, migration of Citrix management environment to the cloud, SUSE/Redhat upgrade, and starting of the Windows 2012 OS upgrade.
- 2024 – Major efforts include the continuation of Windows 2012 OS upgrade and migration of Citrix

[80] *See* Section V.C.4.c, Technology Adoption for historical activities as it relates to cloud transition.

landscape to the cloud, in addition to HCI expansion, Nutanix AHV software upgrade, and Veritas software upgrade.

- 2025 – SCE plans to continue the migration of Citrix to the cloud, upgrade SQL databases, Talend platform upgrade, consolidation and decommissioning of AIX platform, Infoscale upgrade, and preparation of Windows 2016 OS upgrade.
- 2026 – Operating software category efforts include Oracle database upgrade, Veritas platform upgrade, Netapp Ontap upgrade, Ansible upgrade, Windows 2016 upgrade and Weblogic upgrade.
- 2027 – Operating software category efforts include the continuation of Oracle upgrade, Windows 2016 upgrade, GoldenGate software upgrade, and Proofpoint platform upgrade.
- 2028 – Operating software category efforts include the continuation of Oracle/GoldenGate upgrades, Netapp Ontap software upgrade, Nutanix AHV software upgrade, Mongo database upgrade, IBM Guardium platform upgrade, and Genesys software upgrade.

SCE's standard is to maintain software at a version level of N-1, where N is the current production level and we target not less than one version level below. This ensures the software is current on bug fixes and general code maintenance, as required to mitigate cybersecurity exposures, and supports SCE business operational needs. As software deviates from this, it is refreshed accordingly. The expenditures in the forecast period will replace end-of-life operating system software, database systems, middleware tools, security solutions, and environment monitoring and alerting applications.[81]

[81] Refer to WP SCE-06, Vol. 01, pp. 64-66 - Capital Workpapers - Perpetual License SaaS Cloud.

b) Application Refresh

(1) Work Description

The Application Refresh[82] sub-work activity consists of two distinct work activities: (1) management,[83] upgrade, maintenance, optimization, monitoring, and testing of about 700 existing IT applications,[84] 5,000 interfaces,[85] and 400 digital technologies through their lifecycle;[86] and (2) management, data engineering, and analytics activities of increasing volume of structured[87] and unstructured data[88] supporting the applications. These applications, digital tools and technologies, and data management & integration initiatives collectively support a majority of SCE's business processes and capabilities, including mission critical applications that help provide customers with safe and reliable energy along with satisfying mandated compliance and security requirements.

Users of these applications include all SCE employees, multiple external vendor companies, and the customer base which SCE serves. This activity supports both company-wide technologies and internal and external interfaces. An example of an application with an external interface is SCE.com, which is a website portal that then uses internal interfaces to connect with SAP Industry Solution for Utilities (ISU) and Hana databases. Refresh activities for SAP ISU and Hana databases are critical to support the reliability of SCE.com, which is used by SCE customers to pay their bills, to view their balance and usage, to view and report outages, to turn on or off services, and receive

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82 The O&M and capital expenditures for Application Refresh focus on work associated with maintaining *existing* functionalities or capabilities. This is distinct from expenditures for the application refresh components of IT software projects included in SCE-06, Volume 2, which focus on work associated with developing *new* functionalities or capabilities to support the work performed in the various OUs. After those *new* functionalities or capabilities are transitioned to operations post-implementation, the maintenance is covered by the Application Refresh sub-work activity.

83 Includes decommissioning of obsolete applications

84 Prior to Application Rationalization efforts, there are ~900 applications in the IT environment. After the completion of Application Rationalization, the number of applications will be reduced to ~700.

85 Interfaces are sets of defined rules that enable different applications to communicate with each other. They act as intermediary layers that process data transfers between systems. The specific number of applications and interfaces vary from year to year as systems are added to the production environment and others are decommissioned. This is growth from the 2021 GRC, which depicted about 800 existing IT applications and more than 3,000 interfaces through their lifecycle. See Exhibit SCE-06, Vol. 01, Part 1A, pp.42.

86 An application's lifecycle spans from plan, develop, test, deploy, maintain, and eventually decommission.

87 Currently at 1060 Terabytes and growing at 40 Terabyte per month. 1 Terabyte is equal to 1000 gigabyte.

88 Currently at 1.8 Petabyte growing to 6 Petabyte in 3 years due to videos and laser imaging detection technologies. 1 Petabyte is approximately equal to 1 million gigabytes.

updates on Public Safety Power Shutoff (PSPS) events. Other critical applications refreshed by this work activity include: Map3D, GE Smallworld, and Automated Utility Design (AUD).

As discussed in Section I.C. in the coming years, SCE will ensure we are prepared for the increasing and evolving demands on our IT infrastructure, tools, and processes. In order to do so, the Application Refresh activity has experienced portfolio growth as digital platforms and tools were implemented and will continue to be implemented to ensure foundational enablement of digital services. Examples of our digital applications and tools include DevOps Continuous Integration and Deployment tools,[89] Business Process Automations (BPA) Pega,[90] Artificial Intelligence Operations (AIOps) tools Ignio[91] and Nia,[92] and UiPath Robotic Process Automations (RPA)[93] and Robotic Desktop Automations (RDA). These digital tools and platforms are utilized by IT and other OU organizations in their development and maintenance processes, which then enables them to accelerate new solution implementations and support substantial improvements in business operations.[94] These tools and platforms are also used to automate IT and Business processes increasing speed to market, improving the efficiency of repeatable processes, reducing wait time between steps, and improving code quality which contributes to our SCE goals of affordability, reliability, quality and customer satisfaction by standardizing process steps, optimizing the process, and reducing human errors.

Lastly, applications and digital tools will only be as useful as the quality, availability, and usability of the data underlying them. As stated in our introduction, there has been an increasing demand for IT to support Grid Resiliency, Wildfire Risk Mitigation, Grid Modernization, and Customer Service programs, which are all heavily data driven. In addition, there are increased demands for accurate data sharing with regulators and third parties. Because of these reasons, there is also a focus on data and analytics within this work activity, which will ultimately increase our ability to quickly

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89 DevOps services provide workflows, tools, and training to automate Build, Change, and Release processes that enable SCE to deliver business value faster.

90 This technology delivers repeatable automated solutions that can be efficiently reused and tailored to meet requirements of customers and product lines.

91 An AI-driven software that independently detects endpoint issues, triages, and remediates them.

92 This is an intelligent platform enabling enterprises to continually sense, analyze, decide, act and learn from the data generated across business processes, applications and infrastructure layers.

93 A software technology that makes it easy to build, deploy, and manage software robots that emulate human actions interacting with digital systems and software.

94 Refer to Section IV Digital & Process Transformation.

analyze patterns and develop business insights by leveraging data across a variety of sources and mediums. These data improvement initiatives will consist of maturing data environments for self-service enablement of SCE's data catalog,[95] assessment and remediation of data quality of enterprise datasets, implementation of data quality rules,[96] and data engineering to facilitate cost-effective consumption of data for various analytics and data sharing use cases. One example of such data analytics use cases includes Asset Failure Prediction models for different asset types using structured data (e.g. asset maintenance records, asset operations records, asset master data, weather data) and unstructured data (e.g. asset inspection images – ground and aerial) to predict asset failure probability. This allows the organization to make risk informed decision making and optimize asset maintenance work and costs. This also helps mitigate risk related to wildfire due to asset failure.

As SCE responds to market trends and continues to modernize our environments by executing application, interfaces, and data management initiatives, we are forecasting an increase in test year 2025 for O&M and capital expenditures to ensure these applications remain supported with the highest quality and integrity.

(2) Need for Activity

Application Refresh is necessary because applications must be running on vendor-supported versions in order to receive vendor support. If the applications do not run on vendor-supported versions, then our MSP technical teams may be at risk of not receiving vendor support when troubleshooting technical issues that arise in the application, and in some instances additional charges may be incurred for support. For those applications that are proprietary, receiving vendor support is essential in order to troubleshoot. Examples of proprietary applications include Consolidated Mobile Solution (CMS), Power Plan, Spida, Utilities International Planner, iVOS, Openlink Endur Formula Engine, ITRON Meter Data Management System (MDMS), and TeamConnect.

Application Refresh is even more critical for applications that are no longer supported by vendors or are about to reach end of life. In those circumstances, issues encountered by these applications in the production environment may take time to fix or may persist without resolution. This will hamper application availability and may result in these applications not being able

[95] A detailed inventory of all data assets in an organization, designed to help Subject Matter Experts find the most appropriate data and consistently use the data for all reporting, analytics, and data sharing purposes.

[96] Implementation of data quality rules improves overall data quality for third party sharing and reduces the amount of manual effort required to perform data corrections.

to provide needed business functionalities. In addition, the cost to maintain these legacy and unsupported systems will increase, as will the challenge of finding qualified resources to support them.

The Application Refresh activity provides further benefits by improving system availability, stability, sustainability, and reliability. Refreshing the applications reduces the impact to business operations and allows for business continuity by decreasing unplanned outages and by providing the functionality needed by the business units. Ensuring our applications stay within the supported versions, will also increase our reliability and stability by having the availability of patches,[97] which improves application security and performance. Moreover, not performing this work increases SCE's cybersecurity exposure and the potential loss of data or data breaches.

In addition, safety to the public can be impacted by not refreshing applications. For example, the Medical Baseline (MBL) program provides a discounted electricity rate allocation(s) for customers that require the use of electrically powered medical life support devices or equipment. In MBL, the Automated Outage Communication (AOC) system sends outage information to customers through critical systems which include SAP Process Orchestration (SAP PO), SAP Industry Specific for Utilities (ISU), and IBM Data Power. This outage information is then used to minimize the disruption to these residents. Refresh activities associated with AOC, SAP PO, SAP ISU, and IBM Data Power, are critical because unavailability of the applications supporting MBL can negatively impact the well-being of MBL customers.

Consolidated Mobile Solution (CMS) – a COTS application supported by the GoMocha vendor – is another example of an application whose reliability and availability are critical for the safety of our SCE crew and the public. CMS is used by field users for the planning, restoration, inspection, and yearly maintenance of the T&D electrical grid. During emergency situations like wire down situations, troublemen use the distribution circuit data from CMS to quickly determine the circuit configuration and then work with substation operators to quickly isolate and turn off the down wires. Unavailability of CMS can negatively impact the safety of the SCE crew and the public.

A part of managing our applications and interfaces is to ensure the hygiene of our environment. As applications are no longer needed by our users, this sub work activity will reduce outdated and under-utilized applications to ensure our total cost of ownership remains optimized.

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[97] A patch is a modification to a system to improve its security, performance, or other feature. A patch is sometimes referred to as a bug fix since a reason for a patch is an imperfection that is discovered by its developers or users.

To that end, we have started to execute an Application Rationalization initiative, as discussed further in section V.B.4.b.4, Application Rationalization, below.

In addition to the management of our application portfolios, continued investment in digital technologies that support our IT Modernization and Simplification strategy[98] while reducing risk to operations and increasing efficiency through automation is essential. As stated in the work activity section, digital tools and platforms enable and support the development of digital application solutions, advanced analytics, robotic process automation, and emerging technology prototypes.[99] For example, Pega Business Process Management supports our HR Onboarding application and without the necessary upgrades, applications can experience outages, increased downtime, and unexplained failures. If the vendor no longer supports the current version, SCE will need to pay higher support costs, risk not being able to resolve the issue and impact SCE's hiring and onboarding process.

Lastly, accurate data and data engineering is critical for data driven decision making, as well as reducing enterprise reputational and compliance risks related to internal and external data sharing. As an example of criticality of our data for decision making, inaccurate data for asset location will impact timely asset inspections for risk mitigation and service reliability. If we do not inspect assets in a timely manner, the risk of asset failure is increased, thus impacting service reliability. This is even more important in cases of High Fire Risk Area (HFRA). In those cases, if the wildfire risk is not mitigated, not only does it expose SCE to regulatory, reputational, and financial risks, it will increase safety risks for the public, as well as utility/contract employees.

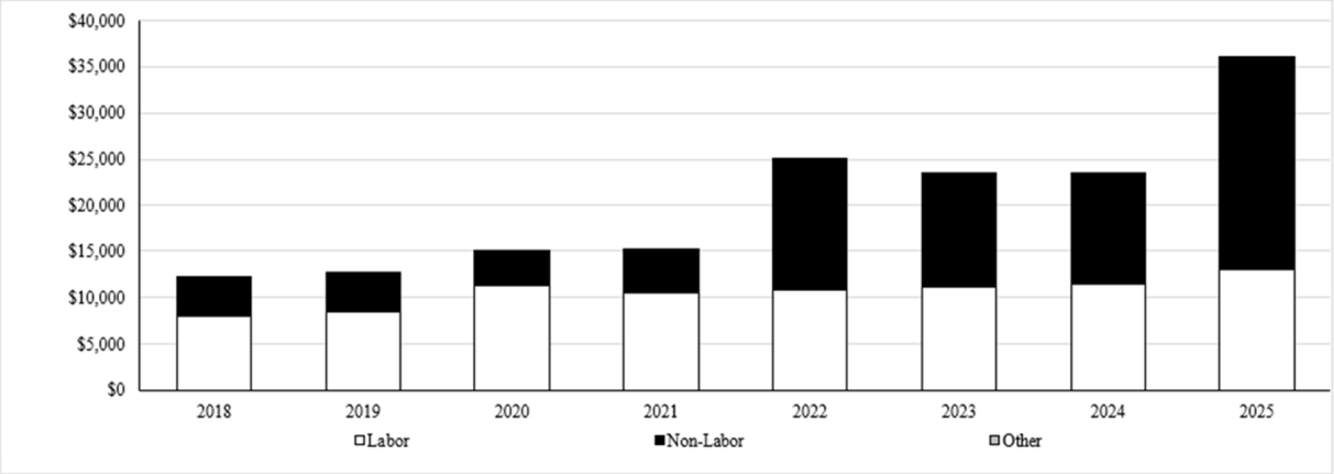
(3) Scope and Forecast Analysis

Figure V-21 provides 2018-2022 recorded and 2023-2025 forecast O&M expenses, broken down by labor and non-labor, for the Application Refresh sub-work activity.

98 Refer to Section I.C.1 Enterprise Technology Focus and Operational Improvements.

99 Also refer to Section IV Digital & Process Transformation.

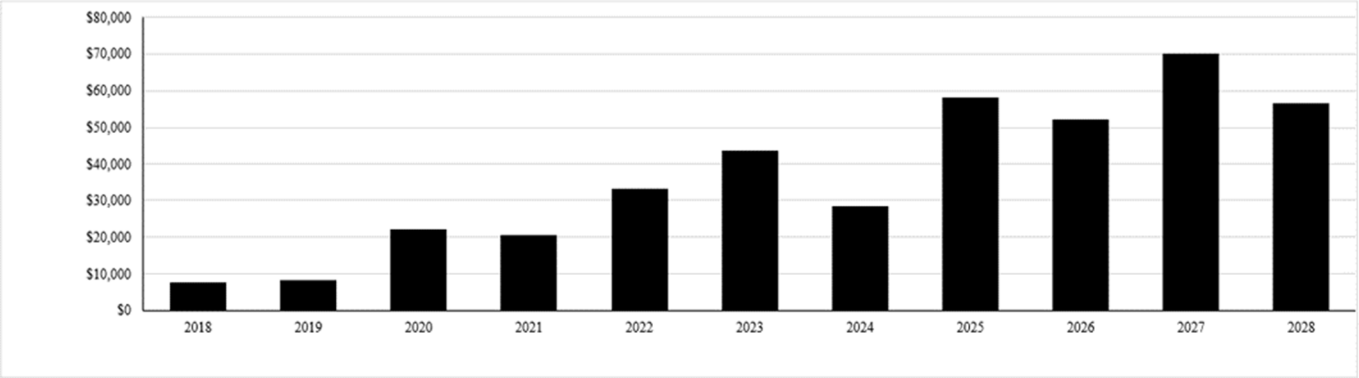
Figure V-21
Application Refresh O&M Expenditures
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$7,930	$8,462	$11,217	$10,529	$10,864	$11,108	$11,382	$12,944
Non-Labor	$4,252	$4,295	$3,844	$4,738	$14,227	$12,454	$12,095	$23,214
Other								
Total Expenses	**$12,181**	**$12,757**	**$15,061**	**$15,267**	**$25,091**	**$23,562**	**$23,477**	**$36,158**

Figure V-22 provides 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Application Refresh sub-work activity.

Figure V-22
Application Refresh Capital Expenditures
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Application Refresh	$7,393	$8,199	$21,795	$20,491	$33,393	$43,589	$28,320	$58,201	$52,075	$70,080	$56,411
Totals	**$7,393**	**$8,199**	**$21,795**	**$20,491**	**$33,393**	**$43,589**	**$28,320**	**$58,201**	**$52,075**	**$70,080**	**$56,411**

(a) Historical Variance Analysis

(i) Labor

The labor costs for Application Refresh represent SCE employees who manage third party MSPs to upgrade, maintain, optimize, monitor, and test about 700 existing IT applications and 5,000 interfaces throughout their lifecycles. SCE employees oversee the MSPs and facilitate service restoration to users of these applications and interfaces in order to ensure system availability, stability, sustainability, and reliability. In addition to facilitating maintenance of *existing* applications and interfaces, SCE employees also facilitate the service transition, quality reviews, and maintenance of *new* capital projects after these projects are transitioned to Operations. They also assist in the planning, implementation, and maintenance of O&M refresh activities while managing the outcome of the MSP activities and helping with application service restorations, which are critical to the overall services we provide to internal SCE departments and the public for business continuity.

From 2018 to 2019, the O&M labor costs increased by $0.5 million as the Field Services Support team moved to Application Services from Service Desk at the end of 2019. Additionally, employees transitioned from San Onofre Nuclear Generating Station (SONGS) into the operations organization, which also contributed to the increase. From 2019 to 2020, the O&M

costs increased further as the service desk team fully charged into this sub work activity and further reorganizations moved employees from architecture into the Application Services organization. SONGS employees continued their transition in 2020 as well, which contributed to the increase. From 2020 to 2021, the O&M labor decreased due to attrition. Finally, there was an increase in labor from 2021 to 2022 due to the creation of the new organization, Engineering and Security Services,[100] within SMOO.

(ii) Non-Labor

Non-labor costs in this category are costs incurred from O&M refresh activities and Consulting and Professional Services (C&PS). Non-labor costs during the period of 2018 to 2021 underwent minor fluctuations as systems reached their end of life and had to be refreshed, and consulting and professional services ebbed and flowed according to the organizational needs. Specifically, in 2021, there were also impacts from the pandemic, which necessitated $0.4 million spend to enhance our outage applications to meet LA County reporting needs as guidelines were determined for COVID. An example of a refresh that was performed within 2018-2021 includes the remediation effort for SAP Business Objects Data Services (BODS) server and Web server for Edison.com,[101] and an example of third-party maintenance support includes Power Plant Premier Support.

However, non-labor related costs increased significantly in 2022 due to the decommissioning of the mainframe[102] and other systems, including Customer Integrated Application (CIA)[103] and Meter Data Management Agent (MDMA).[104] Those were replaced by the Customer Service Re-Platform Project (CSRP). The increase also represents an increase in contractor headcount needed to support the stabilization of CSRP as it was operationalized. Lastly, this increase

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[100] The Engineering & Security Services team is accountable for SCE's strategy of various technologies and implements them with standardized engineering discipline.

[101] These servers were remediated due to the Adobe Flash End of Life. SAP BODS is an integration tool that had components on flash and required an upgrade to remove the components. Web Server for Edison.com is a Windows Internet Information Services (IIS) server that requires work to remove the Adobe Flash content.

[102] Without the decommissioning of the mainframe, CSRP benefits would have been significantly minimized. Please refer to SCE-03, Vol. 01 for discussion on CSRP benefits.

[103] CIA is a system to track Low-Income and Residential customer demand management programs including calls, third party invoices, and customer rebate applications.

[104] MDMA is an application used for delivering billing usage data to Energy Service Providers for Direct Access accounts.

also includes the implementation of 670 data quality rules, along with reduced regulatory and reputational risks related to incorrect data and improved business decision making based on accurate data which began in 2020, ramped up in 2022, and will continue moving forward during the forecast period.

(iii) Capital Expenditures

Consistent with SCE's prior GRCs, the volume and complexity of application refreshes varying from year to year is driven by application obsolescence, which drove the fluctuations between 2018-2022.

Capital costs increased slightly from $7.393 million to $8.199 million between 2018 and 2019.This is mostly attributable to the volume and complexity of the refreshes performed within those years. Some examples of upgrades performed include Analytics Platform Upgrade and PowerPlan Refresh. The impact of the CSRP Program also kept the volume of refreshes performed relatively low, as system freezes were in place during the implementation of the Program.

In 2020, capital spend increased significantly to $21.795 million as more applications were becoming obsolete and the risks to not refreshing were becoming greater than the benefit of waiting to refresh until the implementation of the CSRP Program. The upgrades included: Autocad Map3D refresh and Spida refresh, SAS Viya, Power Plan, Hadoop, Hana, Talend and SAP GRC. Autocad Map3D is a COTS product from Autodesk used to edit and update geographical features and other related attributes of an asset. SAS Viya is used to manage Grid and Wildfire efforts. Additional contributing factors included SCE's customer facing website related to Public Safety Power Shutoff (PSPS) initiatives. These initiatives improve the user experience and strengthen the website's security and performance.

Capital spend from 2020 to 2021 remained stable with a slight decrease as we continued to refresh applications that would incur the most risk if they were out of support. Examples of refreshes performed during that time include: PSPS, SCE.com Wildfire, SPIDA Upgrade, and Hana Analytics Refresh.

Finally, capital spend increased from 2021 to 2022 due to the Application Rationalization effort. This effort decommissioned, consolidated, and modernized existing applications. Additional refreshes in SPIDA and Primavera were initiated to mitigate risks in the applications.

(b) Basis of Forecast

(i) Labor

SCE's 2025 O&M Test Year Forecast for labor is $12.944 million, an increase of $2.080 million from last year (2022) recorded. As in 2021, SCE will continue to require SCE labor in 2025 in order to manage the MSPs, to facilitate maintenance of existing applications and new applications that are transitioned from OUs to Operations, and to manage O&M application refreshes. From 2018-2022, labor costs showed an increasing trend. Therefore, SCE utilizes the last year recorded estimating methodology plus adjustment to form the basis of our Test Year Forecast. This is consistent with Commission guidance to use the last recorded year when historical recorded costs exhibit a trend in one direction over three or more years.

From the 2022 recorded labor amount of $10.864 million, SCE forecasts an increase of $2.080 million. The forecast increase is needed to accommodate backfilling of SCE FTEs to manage the projected increase in application and interface refreshes, to manage the projected volume increase in the applications transferred from OUs to Operations, and to execute data management initiatives. Additionally, the forecast reflects additional FTEs to maintain IT's processes, metrics, and operational reports with a focus on quality, value, and speed from strategy to operational phases for technology. The remainder of the increase is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol. 04. For detailed discussion of these adjustments, please see SCE's supporting workpaper.[105]

(ii) Non-Labor

Our 2025 O&M Test Year Forecast for non-labor is $23.214 million, which is an increase from last year (2022) recorded of $14.227 million. Non-labor expenses in this activity include C&PS, O&M projects, Ongoing Maintenance, and employee expenses. The $23.214 million Test Year forecast[106] consists of an estimated $11.957 million in O&M projects, $6.457 million in C&PS costs, $4.660 million for ongoing maintenance, and $0.139 million for employee-related expense. Table V-11**Error! Reference source not found.** outlines the breakdown of Application Refresh activities by category.

[105] Refer to WP SCE-06, Vol. 01, pp. 67-69 - Application Refresh Labor Workpaper.

[106] Refer to WP SCE-06, Vol. 01, pp. 70-71 - Application Refresh O&M Workpaper Overview.

Table V-11
Application Refresh Activities
(Constant $000)

	Forecast - Constant						
Name	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**Normalized (2025-2028)**
O&M Projects	$ 5,230,506	$ 3,898,069	$ 12,327,593	$ 11,725,576	$ 11,596,232	$ 12,180,427	$ 11,957,457
Consulting and Professional Services (C&PS)	$ 5,161,348	$ 4,438,850	$ 6,536,458	$ 6,482,939	$ 6,430,470	$ 6,379,029	$ 6,457,224
Ongoing Maintenance Costs	$ 1,924,856	$ 3,626,110	$ 4,146,218	$ 4,471,412	$ 4,822,111	$ 5,200,316	$ 4,660,014
Employee Related Expense	$ 137,146	$ 131,764	$ 139,706	$ 139,706	$ 139,706	$ 139,706	$ 139,706
O&M Non-Labor Total	**$ 12,453,856**	**$ 12,094,793**	**$ 23,149,975**	**$ 22,819,633**	**$ 22,988,519**	**$ 23,899,478**	**$ 23,214,401**

For supporting details regarding O&M refresh activities,[107] on-going maintenance for OU Capitalized Software Projects,[108] and C&PS increase justifications,[109] see the associated workpapers.

Similar to the last GRC, Application Refresh utilized an itemized forecast methodology as the basis of its forecast. The drivers of the increases for test year 2025 and forward include growth of our portfolios as technologies impactful to customer satisfaction, affordability, reliability, safety, and quality that were previously implemented become operational, which introduces increases in our consulting professional services, ongoing O&M, or O&M projects categories. Examples of such applications include ISU, Community Choice Aggregation (CCA), Salesforce, and digital technologies. To support ISU, additional SAP and non-SAP professional services are required to maintain the application and ensure billing, invoicing, customer interaction management, and enrollment of customer products and programs. Additionally, as more cities adopt CCA, SCE needs to adapt to ensure we can keep up with the enrollment demand, which increases the need for dedicated support services for CCA onboarding, testing, and ongoing support activities that are not part of our current managed services. Increased support costs for the Salesforce platform is also needed for continued support of Wildfire mitigation through improved inspections of Transmission & Distribution (T&D) assets. Moreover, as new digital applications transition to SMOO, additional support is required to maintain the platforms, tools, and services. Lastly, more and more new capabilities are available primarily through cloud services introducing an increasing shift away from on premise applications and

[107] Refer to WP SCE-06, Vol. 01, pp. 72-90 - Application Refresh O&M Projects Workpaper.

[108] Refer to WP SCE-06, Vol. 01, pp. 91-93 - Application Refresh Ongoing O&M Workpaper.

[109] Refer to WP SCE-06, Vol. 01, pp. 94-106 - Application Refresh O&M C&PS Workpaper.

technologies.[110] As a result, this shift in technologies is moving the spend from Capital to O&M due to current capitalization guidelines, which in turn contributes to the increasing ongoing O&M forecast.

(iii) Capital Expenditures

The total forecast for Application Refresh capital expenditures for 2023 to 2028 are approximately $308.675 million.[111] Application Refresh items that are typically less than $250,000 are categorized as O&M refresh activities. Application refresh items that are $250,000 or greater with the minimum expected useful life of five years are categorized as Capital refresh activities. For each application to be refreshed, the cost is determined by scope and complexity of the software refresh. Included in the cost is testing performed by the Testing Center of Excellence (TcoE) and additional overhead costs like license costs and server replacement or upgrade costs. These refreshes are then categorized and prioritized based on the application's risk, urgency, and magnitude of impact.

Similar to O&M, the increases in dollars over the historical period is also driven by growth in our portfolio due to various business drivers. One significant driver of growth is wildfire mitigation, which increases vegetation management, inspection, weather predictions, aerial inspections, and collaboration tools within our portfolio. This, in turn, increases our forecast as these tools will need to be refreshed periodically to ensure the reliability of the applications. Additional drivers include aging technology which poses a risk to our operations, and requires the need for replacement systems that, in turn, increase refresh costs. As the new systems replace our older applications, we move away from obsolete in-house developed solutions to more vendor supported solutions. As these replacement systems are transitioned to operations, refreshes also must be performed periodically so that we can continue to receive support for these third-party applications. An example of this would be SAP ISU/Cloud of Customer (C4C) which replaced our old mainframe-based customer service system. The increased refresh costs include hardware, integration, software, and support costs from third parties and MSP – costs which were previously minimal. Lastly, factors such as on-premise refresh versus migration to the cloud will impact the cost estimates for a given refresh. Those refreshes that include migration to the cloud, which is done because new capabilities are only available in the cloud, will incur a one-time additional cost to migrate at the time of the refresh.

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[110] *See* Section V.C.4.C Technology Adoption for a full discussion of advantages of movement to the cloud and SCE's plan of cloud migration in the forecast years.

[111] Refer to WP SCE-06, Vol. 01, pp. 107-136 - Application Refresh Capital Workpaper.

Capital expenditures vary each year depending on the life cycle of the application. In 2023, the capital expenditure is forecasted to be $43.589 million. This is attributed to the Application Rationalization, CMS Upgrade, PowerPlan Upgrade, and MDMS Technical Refresh.

In 2024, the forecasted capital spend is expected to decrease by $15.269 million, as there are fewer upgrades/refreshes that need to be done. These include NERC CIP Upgrades, SAP Afaria Replacement and Settlecore Application Refresh.

In 2025, capital expenditures are expected to increase. This increase is primarily due to the refresh of applications to improve system stability and reliability and reduce the risk of unplanned outages which can potentially lead to safety incidents. One of the biggest drivers of the increase in 2025 is the refresh of SAP ISU. SAP ISU is a critical application as it supports business functions such as billing, invoicing, accounting, customer interaction management and customer products and programs enrollment. This system integrates with other internal systems including meter data management (MDMS), corporate financial system (SAP ECC) and Enterprise Data Warehouse (EDW). SAP ISU is planned to be refreshed every three years. Other examples of applications that need to be refreshed in 2025 include: Pega BPM, Chat Bot, Graphical Information System (GIS) optimization, Fiori Modernization, and BMC Remedy.

In 2025, the Data Management work is another driver of the increase in capital spend. SCE plans to improve end-to-end data management capabilities to strengthen data insights driven decision making, data/analytics augmented business processes, and accurate data sharing. There are four main components of data management including: Evolve Data Environments, Trusted Datasets, Data Engineering and Advanced Analytics. Planned activities for 2025 include the following: (1) Establish Data Catalog tool selection and deployment to support consistent use of enterprise data across use cases and for data sharing, (2) Data quality issues remediations based on findings from data quality assessment and dashboards for customer usage, billing, and prioritized T&D asset datasets; (3) Enabling self-service data engineering and data pipelines capabilities for deriving data insights and for cost effective build and deployment of analytical models; and (4) Continue build of Enterprise Datawarehouse/Data lake in cloud (Snowflake/SAP Datawarehouse Cloud) with additional datasets for advance analytics and data science.

In 2026, the capital expenditures are expected to decrease by $6.126 million, due to fewer and less complex upgrades/refreshes. The applications to be refreshed

include: MDMS Upgrade, Cell Relay Configuration Management (CGM) & Cell Relay Availability (CRA), AI Ops Re-platform, and AUD Client Upgrade. Data Management will continue to improve technical data standards for data sharing and data integration in collaboration with regulatory agencies and other utilities. Additionally, this work stream will continue to mature data sharing based on common data exchange standards, enabling modern data sharing technology and methods. Lastly, in 2026 this work stream will continue to mature data science capabilities across the entire data platform fabric (Cloud Snowflake EAP, SAP Cloud Data Warehouse, Google Cloud Platform) for structured and unstructured datasets to facilitate Artificial Intelligence/Machine Learning (AI/ML) augmented business processes and decisions.

In 2027, there is a projected increase in capital spend of $18.005 million. Examples of applications planned to be upgraded are BMC Remedy, OpenText, Chatbot Re-platform, and ArcGIS Upgrade. Data Management will continue to build out of SCE's digital data platform and advanced analytics capabilities, expand enterprise data catalogs to cover additional datasets in data platforms, and expand data quality assessments and remediations and monitoring based on Data Quality dashboards for additional data areas including products and programs, sales and marketing, work management, DER, additional T&D asset types and expand data portal and data engineering solutions to improve internal and external data sharing and consumption.

In 2028, the forecasted capital spend is expected to decrease by $13.669 million, again due to fewer and less complex upgrades/refreshes. Examples of applications to be refreshed include SAP ISU refresh with migration to the cloud, Design Manager, GE Smallworld, and SailPoint IIQ. Data Management will build additional value-added datasets in support of business-critical use cases for all OUs and expand build of data quality checks and rules in transactional systems to prevent data quality issues.

a. Application Rationalization

As described in the Basis of Forecast section above, IT is facing a tremendous amount of growth and cost pressures in order to meet the demands of the business (e.g., Wildfire, CCAs, Pathway 2045) and to mitigate effects from aging systems. To control this growth, SCE IT is making a concerted effort to ensure we rationalize our application portfolio and keep costs down. Prior to the Application Rationalization effort, IT managed ~900 different technology applications and related hardware platforms to support operating units across SCE. As part of IT's continual effort to reduce costs, SCE's IT has and will continue to implement an application

rationalization effort, which includes activities to consolidate hardware, migrate to lower cost alternative platforms and licensing packages, and decommission approximately 20 percent of IT's applications portfolio. This program will be implemented through 2024, costing $10.95 million and resulting in $3.431 million in O&M savings (constant dollars) per year and $3.000 million in Capital savings impacting Data Center Infrastructure and Perpetual licenses, SaaS, and Cloud sub work activities.[112] Without this application rationalization effort, SCE IT would have seen even higher increases in our forecasts and would not be able to manage the growth down to a reasonable level. Additionally, decommissioning of these under-utilized applications will improve efficiencies in IT service operations and avoid cybersecurity risks by removing non-supported systems from our environment.

The key assumptions for the savings to be achieved is that all individual tracks within the program will need to be completed within the timelines set by the program. Delays in implementations could cause the applications to incur increased costs by reaching their refresh cycle or extended support. Key dependencies include continued resource availability from both internal IT resources and from vendor support. Additionally, OU decision support for the execution of these efforts will be required.

An alternative considered for this effort would be to keep the environments as-is and not migrate, decommission or consolidate the applications. This was not a desirable option as the under-utilized applications are not supported, and in some cases, cause a cyber risk. An additional alternative considered was an increased scope of applications to be decommissioned. The scope was refined to the current scope, as not all ideas met the prescribed assessment of Return on Investment (ROI).[113] Moving forward, SCE plans to continue the activities of application rationalization within IT's operations to ensure we only maintain applications and hardware that are truly needed in our environment.

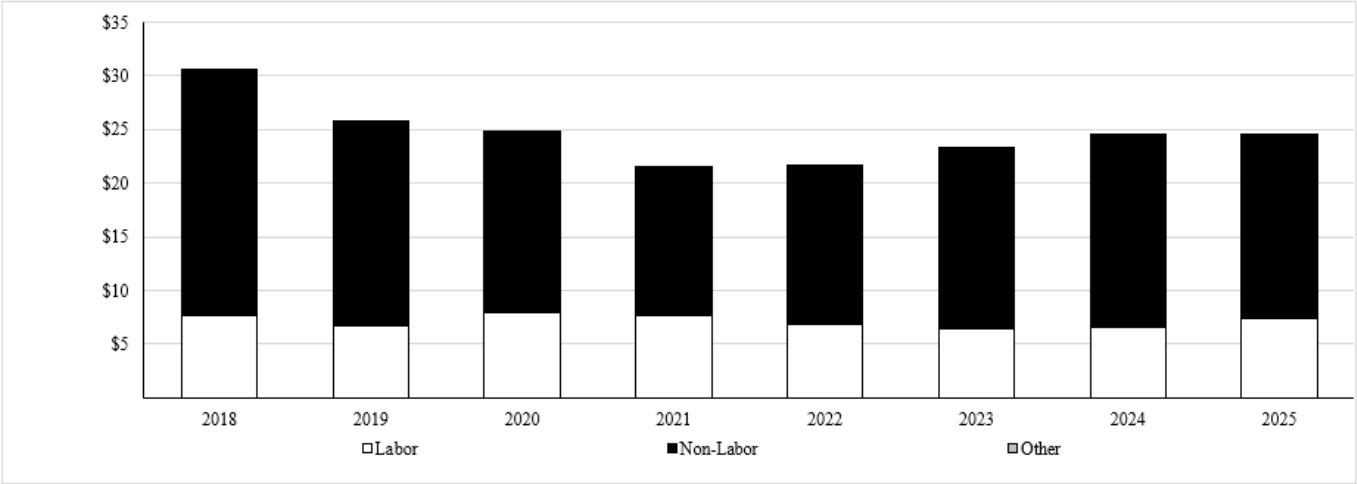
[112] For more details on savings by sub work activity, refer to WP SCE-06, Vol. 01, pp. 1-71 - **Confidential** O&M Workpapers - Perpetual License SaaS Cloud and WP SCE-06, Vol. 01, pp. 166-167 - Capital Workpapers - Server Replacement.

[113] Financial Benefit-to-Cost Ratio (BCR): 0.7x hard savings and 1.3x including soft benefits such as cost avoidance (through archival and consolidation of applications), implementation in 24 months or less, and improve resiliency and optimize landscape (including infrastructure).

C. Technology Infrastructure Maintenance & Replacement

Figure V-23 and Table V-12 provide 2018-2022 recorded and 2023-2028 forecast O&M expenses, broken down by labor and non-labor, for the Technology Infrastructure Maintenance & Replacement work activity and its sub-work activities.

Figure V-23[114]
Technology Infrastructure Maintenance & Replacement O&M Expenses
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$7,664	$6,666	$7,942	$7,669	$6,870	$6,506	$6,555	$7,434
Non-Labor	$22,946	$19,149	$16,874	$13,890	$14,883	$16,835	$18,035	$17,171
Other								
Total Expenses	**$30,610**	**$25,815**	**$24,816**	**$21,559**	**$21,754**	**$23,341**	**$24,590**	**$24,605**

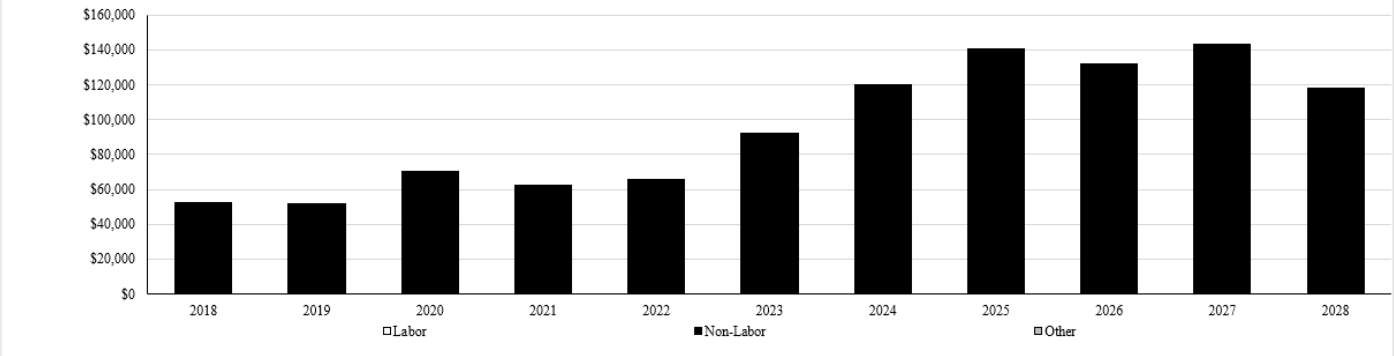
[114] Refer to WP SCE-06, Vol. 01, pp. 137-156 - Technology Infrastructure Maintenance & Replacement – Standard Workpapers.

Table V-12
Technology Infrastructure Maintenance & Replacement O&M Expenses by Sub Work Activity
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)

	Recorded					Forecast		
	2018	2019	2020	2021	2022	2023	2024	2025
Data Center Infrastructure	$13,616	$9,192	$10,128	$8,358	$7,746	$9,911	$10,613	$9,371
End User Computing Maintenance, Services, & Replacement	$16,993	$16,622	$14,688	$13,201	$14,008	$13,429	$13,978	$15,234
Totals	**$30,610**	**$25,815**	**$24,816**	**$21,559**	**$21,754**	**$23,341**	**$24,590**	**$24,605**

Figure V-24 and Table V-13 provide 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Technology Infrastructure Maintenance & Replacement work activity and its sub-work activities.

Figure V-24
Technology Infrastructure Maintenance & Replacement Capital Expenditures
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Technology Infrastructure Maintenance	$52,155	$51,778	$70,222	$62,535	$65,743	$92,068	$120,103	$140,286	$132,271	$142,969	$118,291
Totals	**$52,155**	**$51,778**	**$70,222**	**$62,535**	**$65,743**	**$92,068**	**$120,103**	**$140,286**	**$132,271**	**$142,969**	**$118,291**

Table V-13
Technology Infrastructure Maintenance & Replacement
Capital Expenditures by Sub Work Activity
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)

	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Data Center Infrastructure	$36,687	$35,774	$54,508	$38,243	$28,349	$46,852	$67,102	$84,835	$72,727	$92,096	$63,302
End User Computing Maintenance, Serv	$14,554	$15,574	$12,272	$21,611	$29,560	$29,837	$41,316	$44,994	$50,041	$41,291	$45,176
Technology Adoption	$914	$429	$3,442	$2,681	$7,834	$15,379	$11,685	$10,457	$9,503	$9,582	$9,812
Totals	**$52,155**	**$51,778**	**$70,222**	**$62,535**	**$65,743**	**$92,068**	**$120,103**	**$140,286**	**$132,271**	**$142,969**	**$118,291**

1. Overview of Work Activity

The Technology Infrastructure Maintenance and Replacement work activity is critical to the support of the business applications and services that allow SCE to safely deliver reliable, clean, and affordable energy for customers. This activity consists of three sub-work activities: (1) Data Center Infrastructure; (2) End User Computing Maintenance, Services & Replacement; and (3) Technology Adoption.

Data Center Infrastructure covers the computer, storage, and network infrastructure housed in two SCE enterprise data centers: Alhambra Data Center (ADC) and Irvine Operations Center (IOC). This sub-work activity involves the procuring, installing, and maintenance of all enterprise data center hardware infrastructure. This infrastructure is inclusive of over 8,900 midrange servers (UNIX, Linux, and Wintel), over 5 petabytes of data storage (SAN+NAS), over 600 data network routing and switching infrastructure and 1000 appliances to support over 500 large data repository solutions.[115]

The End User Computing Maintenance, Services & Replacement sub-work activity covers the performance management of SCE's Service Desk and maintenance of devices. SCE's Service Desk handles approximately 17,300 calls per month. SCE has a system to funnel calls into different tiers based on the type and complexity of the issue. The Service Desk also resolves about 208,000 service tickets per year (about 80% are restoration services, while 20% are service requests). SCE employs certain SLAs that govern response times for service requests and service restoration incidents. For example, the Service Desk must respond to 99% of electronic requests within 14 minutes from the time

[115] This is tremendous growth from the 2021 GRC, which depicted inclusion of a mainframe platform (primary and disaster recovery), over 7,500 midrange servers (UNIX, Linux, and Wintel), over 2,000 terabytes of data storage, 700 data network routing and switching infrastructure inclusive of copper and fiber-optic cabling, and 400 appliances to support over 500 large data repository solutions. See 2021 Exhibit SCE-06, Vol 01, Part 1A p. 54.

of submission. In addition, End User Computing Maintenance, Services and Replacement includes management of approximately 8,500 smart phone plans, 10,000 tablet cellular data and Apple care, 3,500 air cards, 885 printers, 225 plotters, 17,200 laptops and desktops, 1,020 teleconference rooms with AV equipment across the company, and 19 Mauell Walls (monitors).[116]

Lastly, the Technology Adoption sub-work activity consists of the retirement of computer, storage, network, and operating software assets and the replacement of these assets with hardware and operating software that may be more operationally efficient with improved performance and system reliability to leverage new and emerging technologies such as the cloud which bring capabilities that are not feasible on site. As SCE continues its adoption of cloud technologies utilizing the Microsoft Azure Cloud computing platform and Google Cloud Platform services, the focus over the 2023-2028-time frame will be in the following areas:

- Cloud Transition
- Business Resiliency
- Automation
- Cost Management
- Compliance
- Identity Management

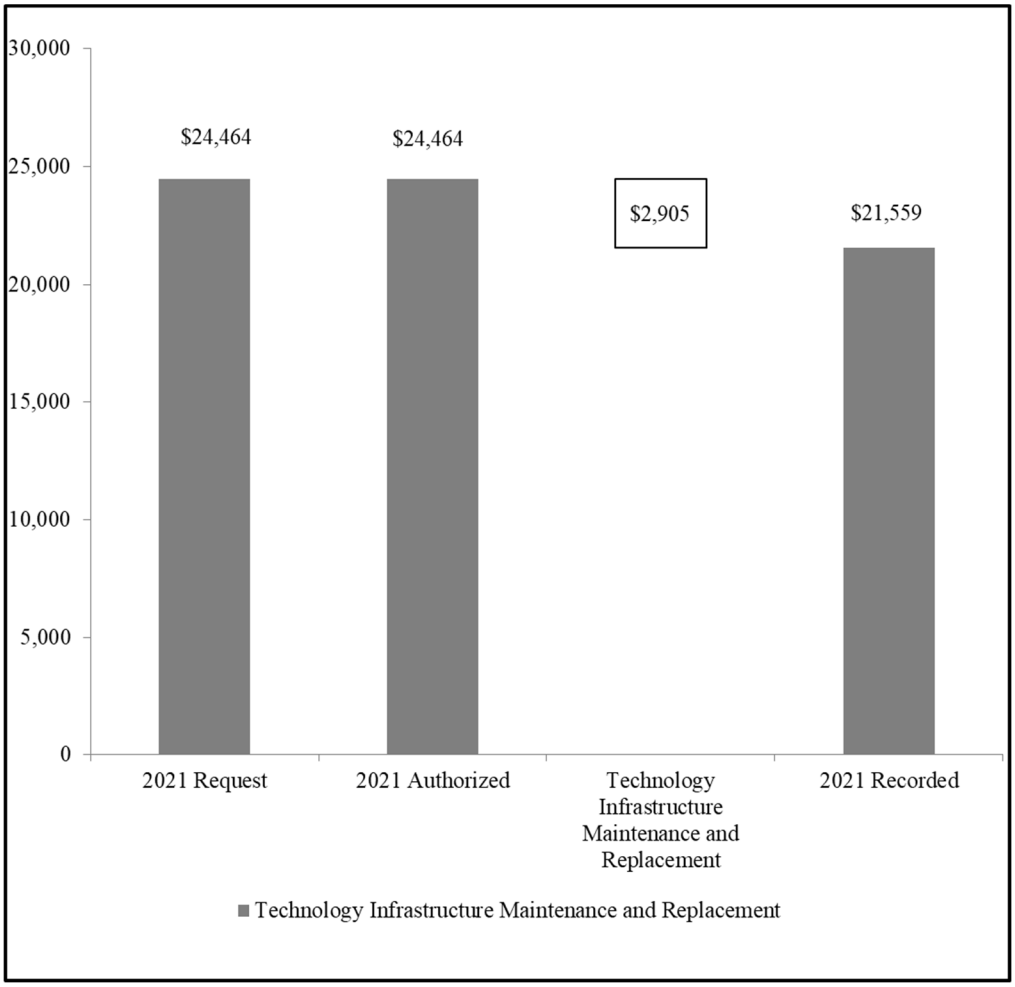
Overall, for Technology Infrastructure Maintenance and Replacement, SCE forecasts $24.605 million (constant dollars) for test year 2025 and 2023-2028 capital expenditures of $745.987 million (nominal dollars).[117]

[116] This is growth from the 2021 GRC, which included management of approximately 7,500 smart phone plans, 1,500 tablet cellular data and Apple care, 4,500 air cards, 1,256 printers, 225 plotters, 16,000 laptops and desktops, 108 teleconference rooms with AV equipment across the company, and 19 Mauell Walls (monitors). See 2021 Exhibit SCE-06, Vol. 01, Part 1A pp.54-55. Note that upon preparing this testimony, we discovered that there was an incorrect number for teleconference rooms in the 2021 GRC. This number should have been approximately 1000 instead of the 108 included in testimony.

[117] Calculation of normalization amount is as follows: [2025 amount of 18,259 + 2026 amount of 17,420 + 2027 amount of 17,669+ 2028 amount of 15,336] /4= the updated 2025 normalized amount of **$17,171**. Dollars are in constant and in '000. Refer to WP SCE-06, Vol. 01, pp. 157-158 - Technology Infrastructure Maintenance & Replacement Normalization for detailed calculations of non-labor expenses.

2. Comparison of Authorized 2021 to Recorded - O&M

Figure V-25
Technology Infrastructure Maintenance & Replacement
Comparison of 2021 Authorized versus Recorded O&M Expenses
(Constant 2022 $000)



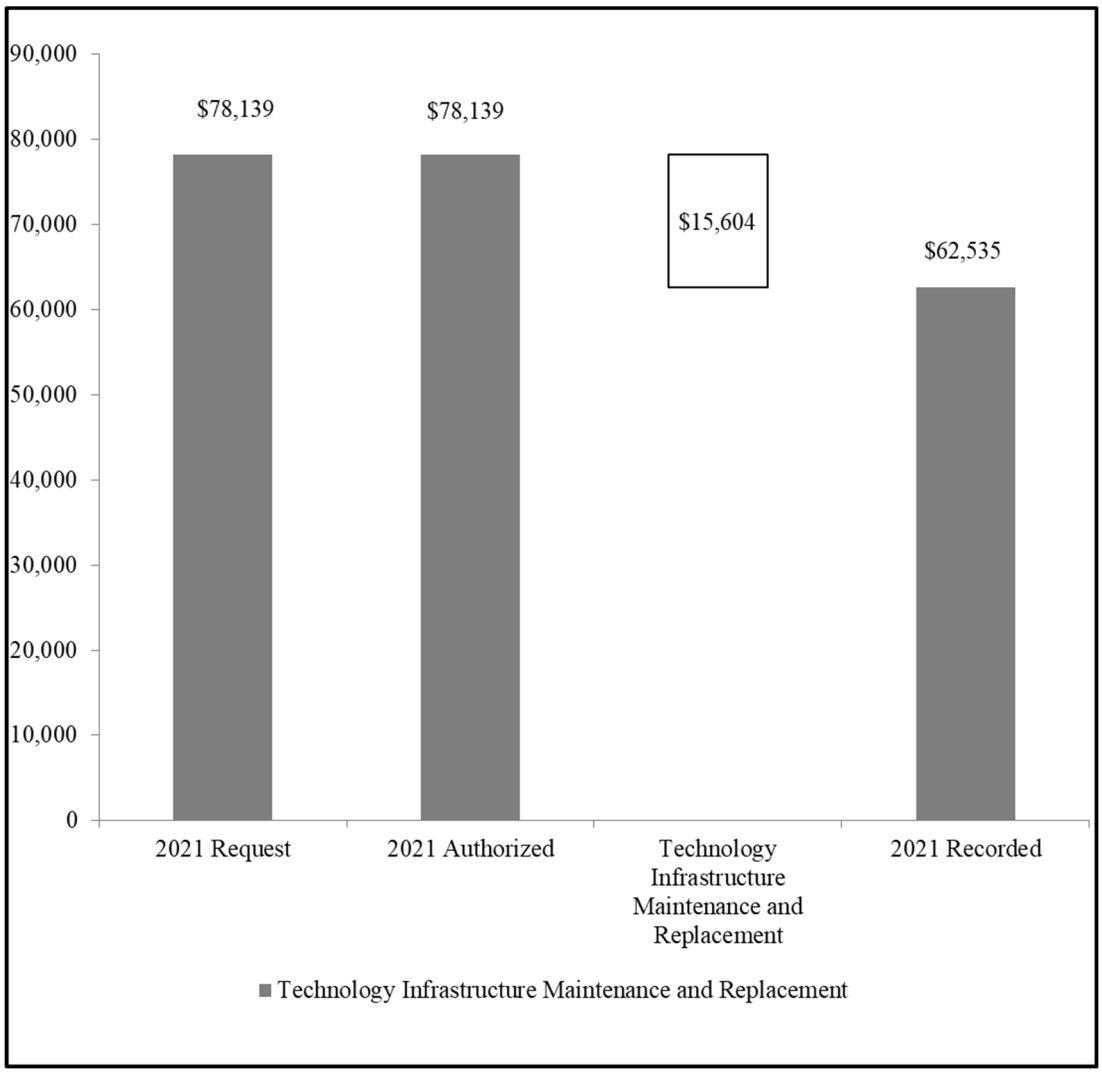
SCE was authorized $24.464 million in O&M expenses for Technology Infrastructure Maintenance & Replacement in the 2021 GRC. This work activity's recorded 2021 O&M expenses were approximately $21.559 million which was $2.905 million below authorized.[118] The spending below authorized in the Data Center Infrastructure space is primarily due to: (1) lower costs resulting from a shift to appliances which capitalized the expenses we would have incurred in the storage and server hardware O&M maintenance categories; and (2) resources charging projects, like CSRP. Additionally,

[118] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

due to the pandemic impacts in the End User Computing sub work activity, SCE collected air cards used by sequestered individuals and retired the paging system because the communication to employees was now done via phone text, which contributed to the lower than authorized spending.

3. Comparison of Authorized 2021 to Recorded - Capital

Figure V-26
Technology Infrastructure Maintenance & Replacement
Comparison of 2021 Authorized versus Recorded Capital Expenditures
(Nominal $000)



SCE was authorized $78.139 million in capital expenditures for Technology Infrastructure Maintenance & Replacement in the 2021 GRC. This work activity's recorded 2021 capital expenditures were approximately $62.535 million which was $15.604 million below authorized.[119]

[119] *See* WP SCE-07, Vol. 01, Authorized vs. Recorded.

The $15.604 million underrun is due to a $15 million underrun in Data Center Infrastructure resulting from delays in the Data Center Refresh project from 2021 to 2022/2023 due to CSRP implementation and global supply chain issues impacting equipment availability, and an underrun of $2.3 million in Technology Adoption due to a shift in project scope (e.g., Enterprise Analytics to Snowflake). These underruns were offset by slightly higher spend in End User Computing Maintenance, Services & Replacement of $1.7 million.

4. Sub-Work Activities

a) Data Center Infrastructure

(1) Work Description

The Data Center Infrastructure sub-work activity is comprised of activities related to refreshing and maintaining the computer, storage, and network infrastructure housed in the two enterprise data centers: Alhambra Data Center (ADC) and Irvine Operations Center (IOC).[120] These activities, typically deemed as capital expenditures, fall into the following categories: (1) Server Replacement; (2) Storage Replacement; (3) Data Center Network Replacement; (4) Appliance Replacement; and (5) Organic Growth.

(a) Server/Storage Replacement

For our server environment, SCE leverages a virtualization architecture to deliver critical business functions for our customers. This environment enables us to run multiple applications on a shared physical server environment. For data storage, SCE utilizes a storage architecture providing discrete storage devices supporting enterprise systems. Routine refreshes of the midrange server, and associated data storage infrastructure is encompassed in this category.

(b) Data Center Network Replacement

As SCE continues to focus on building a more resilient network infrastructure both for internal business operations as well as to serve our customers, we will have to adopt technologies to meet this objective. The data center network must be maintained in alignment with the wide area network (WAN) infrastructure to support internal SCE business operations and communications as well as the internet to support customer services and communications with the appropriate external organizations. This category includes the replacement of the network infrastructure components needed to accommodate client communications needs throughout the enterprise.

[120] The two co-primary production data centers, ADC and IOC, provide disaster recovery (DR) for one another.

(c) Appliance Replacement

SCE's IT infrastructure leverages the "appliance model" for large data processing systems such as data warehouse solutions, various database systems, and specialized solutions. An "appliance" combines individual hardware (e.g., servers, storage) and software assets into a single device performing previously discrete functions in an operationally simplified manner, resulting in operational efficiencies and improved price/performance. The "Appliance Replacement" category refers to the refresh activities of these appliances, including refresh of the hardware and associated operating software bundled in the appliance platform maintained under the same five-year lifecycle as with other data center infrastructure components.

(d) Organic Growth

The growth of SCE's IT hardware infrastructure supporting business applications is driven by the number of users, peak concurrent usage, functionality in the application, and the data volume generated and stored according to SCE's data retention policies. This category addresses replacement of infrastructure supporting mission-critical, as well as other business, applications. This integrated infrastructure landscape must meet the growth in usage of SCE business applications required to run our day-to-day operations. Retaining data for legal and business requirements is the most significant business driver of data growth. For example, for supply chain management, all purchase orders must be maintained for five years after the purchase order expires. Similarly, all SCE financial data stored in the Business Warehouse is retained for seven years.

This need for the organic growth capacity is in addition to the base level of capability provided by routine hardware replacement. Additional growth capacity needs may include any of the following infrastructure components:

- Servers;
- Storage hardware;
- Appliances;
- Data center network communications equipment and other datacenter facility equipment;
- Disaster recovery infrastructure; and
- Operating software for the above components.

Our methodology for determining the growth in capacity needed is driven by the natural growth of processing, data storage, and associated internal SCE network

communications resulting from increased transactional activity and the associated data retention requirements. Our transactional activity has driven our data storage usage growth for the 2019-2022 timeframe year over year by 8 to 10%.[121] This growth is due to data and transactional increases in:

- SAP ECC, IS-U and Business Warehouse: This growth in data is forecasted to increase to 20% year-over-year[122] due to increases in archival data and business functionality coming from new programs such as NextGen ERP[123] and the implementation of new critical business functionality such as billing, customer contact center functionality and other customer programs in the future.
- Advanced Metering Infrastructure (AMI): The growth in data has increased by four times due to the need to increase meter reading intervals from 60 minutes to 15 minutes, requiring greater processing power and increased storage to meet the demand. Approximately 1.8 million meters have been converted with approximately 3.4 million remaining.
- Introduction of new demand response programs and more options to our customers such as Emergency Load Reduction Program (ELRP) and third-party data sharing (e.g., with CCAs) require a higher amount of granular data sharing. This data sharing occurs internally at SCE, and with third parties such as GRIDX, and Demand Response Providers for customer credit calculations and processing of that data for customer billing. CCA data cleansing, preparation, and onboarding has driven the need for increased storage and processing to meet the greater demand. Subsequently, we have a higher volume of data in the form of charges, etc., based on the data we are

[121] Refer to WP SCE-06, Vol. 01, pp. 159-163 - Data Storage Capacity Growth Trend.

[122] This growth in storage is projected to increase from 973 Terabyte to 2.4 Petabyte in 2028 (more than double).

[123] *See* Exhibit SCE-06, Vol. 02 OU Capitalized Software.

sharing. This data volume will continue to drive increases in storage and processing due to a larger set of meters moving to 15-minute intervals, as well as an increase in Net Energy Metering (NEM)[124] customer volume.

The infrastructure hardware mentioned above represent the types of capital expenditures in this sub-work activity. The corresponding O&M expenses in this sub-activity consist of SCE staff to manage performance of MSPs performing acquisition, configuration, and installation of infrastructure hardware/software, as well as troubleshooting activities.

It also consists of non-labor expenses necessary to maintain the IT infrastructure hardware within SCE's production data centers and which are provided through support agreements with the respective hardware vendors. The capitalized hardware replacements benefit from purchasing prepaid maintenance agreements, typically over five years. After the five-year period ends, the O&M hardware support expenses are accumulated, tracked, and reported through non-labor expenses in this sub-work activity.

(2) Need for Activity

In order to mitigate risk to SCE business operations, it is important for SCE to sustain our standard hardware refresh cycle. SCE uses a five-year life cycle[125] as an effective and operationally prudent standard to maintain IT systems reliability. This applies to all IT infrastructure hardware. Refresh costs for IT infrastructure hardware are captured as capital expenditures. Historical experience has shown that extending hardware beyond this five-year life cycle results in hardware more prone to outages due to lack of spare parts, lack of support for operating software and firmware, and an inability to consistently stay current not only on a specific hardware component but also on the integration with other hardware equipment/components. This can and does have a negative effect on

[124] The Net Metering Program is a program where a customer who produces his or her own electricity can offset the cost of the energy consumed throughout a 12-month period by participating in the NEM tariff. The customer must have an eligible small renewable energy generation system installed and connected to SCE's system. When a customer generates a surplus of energy beyond what is consumed, it is credited to the account at the same rate they would have been charged had the electricity been purchased from SCE.

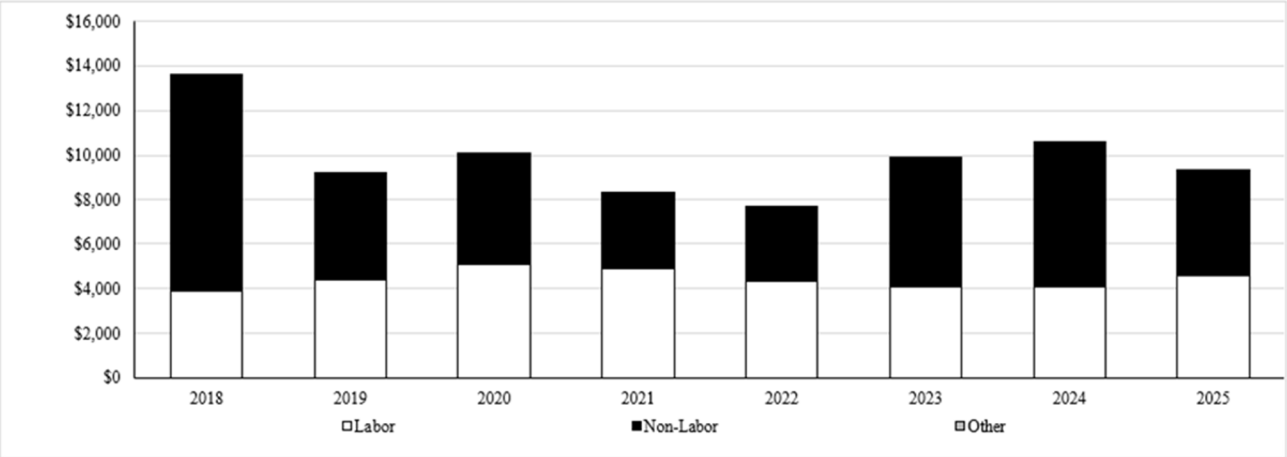
[125] Industry expert Gartner Group recommends five year service lifecycles. *See also* https://www.revolutiongroup.com/blog/how-often-should-i-replace-my-servers/ ("[W]e recommend to always follow the manufacturer's warranty and their recommended replacement timeline. Those timelines typically vary from 3-5 years and very rarely extend past 5 years. Why? Because it becomes extremely expensive to support a server after it has been running for 5 years. Statistics show it costs 200% more to support for a server that is 5 years old or older.").

business application functionality and reliability and, more importantly, on business services internally within SCE and externally for our customers. To extend hardware beyond this five-year life cycle not only increases the potential for interruptions to business operations but will also result in unnecessary IT operational expenditures. Lastly, aging hardware may result in cybersecurity vulnerabilities that cannot be patched which could lead to potential loss of data or data breaches. The benefit to maintaining a five-year refresh life cycle is not only mitigation of the aforementioned issues but also increased performance, reliability, accessibility, and serviceability.

(3) Scope & Forecast Analysis

Figure V-27 provides 2018-2022 recorded and 2023-2025 forecast O&M expenses, broken down by labor and non-labor, for the Data Center Infrastructure sub-work activity.

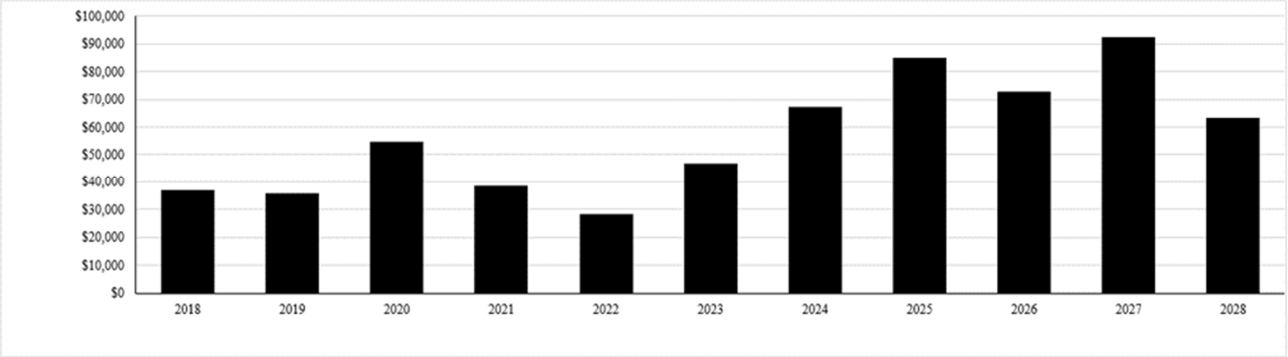
Figure V-27
Data Center Infrastructure O&M Expenses
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	2019	2020	2021	2022	2023	2024	2025
Labor	$3,914	$4,357	$5,053	$4,905	$4,297	$4,076	$4,060	$4,604
Non-Labor	$9,703	$4,835	$5,075	$3,454	$3,449	$5,836	$6,553	$4,767
Other								
Total Expenses	**$13,616**	**$9,192**	**$10,128**	**$8,358**	**$7,746**	**$9,911**	**$10,613**	**$9,371**

Figure V-28 provides 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Data Center Infrastructure sub-work activity and further breaks these expenditures down into the categories discussed in the Work Description section above.

Figure V-28
Data Center Infrastructure Capital Expenditures-2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Data Center Infrastructure	$36,687	$35,774	$54,508	$38,243	$28,349	$46,852	$67,102	$84,835	$72,727	$92,096	$63,302
Totals	**$36,687**	**$35,774**	**$54,508**	**$38,243**	**$28,349**	**$46,852**	**$67,102**	**$84,835**	**$72,727**	**$92,096**	**$63,302**

	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Data Center Infrastructure	$ 36,687,279	$ 35,774,387	$ 54,507,680	$ 38,242,917	$ 28,348,937	$ 46,851,838	$ 67,102,436	$ 84,834,673	$ 72,726,674	$ 92,095,952	$ 63,302,480
Totals	$ 36,687,279	$ 35,774,387	$ 54,507,680	$ 38,242,917	$ 28,348,937	$ 46,851,838	$ 67,102,436	$ 84,834,673	$ 72,726,674	$ 92,095,952	$ 63,302,480
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Mainframe Replacement	6,775,287	574,959	404,211	-	-	-	-	-	-	-	-
Server Replacement	12,338,495	5,410,807	1,476,328	240,838	198,600	16,914,750	8,369,769	2,606,917	3,728,527	24,471,098	21,733,662
Storage Replacement	979,184	1,550,041	329,887	6,835	6,848	5,400,000	7,045,619	12,703,566	25,416,754	31,852,480	17,394,558
Data Center Network Replacement	7,223,944	4,266,174	7,794,646	3,043,762	5,831,085	13,287,988	14,248,968	13,121,047	4,780,498	17,665,159	11,078,325
Appliance Replacement	-	18,234,493	35,253,806	26,526,372	20,567,078	7,217,674	33,205,342	50,119,094	33,413,735	11,285,293	8,406,863
Organic Growth	9,370,370	5,737,913	9,248,802	8,425,110	1,745,325	4,031,426	4,232,738	6,284,050	5,387,161	6,821,922	4,689,072
Subtotals	$ 36,687,279	$ 35,774,387	$ 54,507,680	$ 38,242,917	$ 28,348,937	$ 46,851,838	$ 67,102,436	$ 84,834,673	$ 72,726,674	$ 92,095,952	$ 63,302,480
Totals					$ 193,561,200						$ 426,914,053

(a) Historical Variance Analysis

(i) Labor

From 2018-2020, there were increases in this sub-work activity reflecting (1) resources charging to the CSRP program in prior years returning to operations, and (2) additional service managers transferring from other areas of the organization in a restructuring effort. From 2020-2022, minor changes were due to normal employee movements and attrition.

(ii) Non-Labor

Recorded costs during 2018-2022 experienced a peak in 2018. In 2018, there was a *one-time* increase in O&M expenses due to a change in capitalization rules for hardware maintenance, resulting in a transfer of $3.9 million from capital to O&M cost

accounting.[126] In 2019-2022, the accounting change did not take place, so the spend reflected purely the activities done within this time period. In 2019-2022, cost fluctuations were attributed to changes in hardware refresh cycles (e.g., years with higher capital hardware refreshes will result in lower hardware maintenance costs, and in years with lower capital hardware refresh, there are higher hardware O&M maintenance costs).

(iii) Capital Expenditures

From 2018 to 2022, the recorded capital expenditures for the Data Center Infrastructure sub-work activity was $193.561 million. The main drivers for the year over year variances for Data Center Infrastructure expenditures are made up of organic data growth and the continued migration from midrange servers to Hyper-Converged appliances. In 2020 we had higher than usual expenditures due to the need to build out the foundation necessary for Hyper-Converged infrastructure appliances.[127]

See below for the historical variance analysis divided into the categories described in the work activities section:

- **Mainframe Replacement:** Recorded expenditures of $6.775 million for the 2018 refresh of the Alhambra Data Center (ADC) mainframes. Recorded expenditures of ~$1 million in 2019-2020 reflect capacity growth for the IOC mainframe needed for CSRP support. As the mainframe has been decommissioned, it was replaced by SAP systems (e.g., Business Warehouse and IS-U (Industry Solutions Utility)) described in the server replacement and storage replacement categories below.
- **Server Replacement:** SCE recorded $19.665 million for 2018-2022 to acquire/replace midrange server hardware. These recorded expenditures include costs for acquiring, building, configuring, and testing midrange servers to replace existing servers at the end

[126] *See* Exhibit SCE-07, Vol. 01 for SCE's accounting practices.

[127] Hyper-converged infrastructure (HCI) is a software-defined, unified system that combines all the elements of a traditional data center: storage, compute, networking and management.

of their useful life. The lower expenditures beginning in 2020 is in alignment with SCE's strategy to migrate from Midrange Servers to Hyper-Converged Infrastructure (HCI) Appliances providing improved operational efficiencies. Hyper-Converged Infrastructure Appliances were implemented for non-SAP systems only. SAP systems were not a candidate for hyper-converged appliances due to vendor support requirements. Dollars described in the forecast period in this category describe funding needed to refresh SAP servers.

- **Storage Replacement:** SCE recorded $2.873 million for 2018-2022 to acquire/replace storage systems. These recorded expenditures include costs for acquiring, building, configuring, and testing storage arrays to replace existing equipment at the end of their useful life. The lower expenditures from 2020-2022 are in alignment with SCE's strategy to migrate from Midrange Storage to Hyper-Converged Appliances.
- **Data Center Network Replacement:** SCE recorded $28.159 million for 2018-2022 within this category. Data center equipment refresh was typical for this category for 2019 and 2021. Expenditures in 2018 were higher than normal due to an operational need to begin the refresh of our data center network equipment infrastructure in our Alhambra Data Center. Expenditures in 2020 were higher than normal due to the implementation of the Data Center RFID (Radio Frequency Identification) asset tracking system needed to improve asset tracking and operational efficiencies. Expenditures in 2022 were higher than normal due to

an operational need to begin the refresh of our data center network equipment infrastructure in our Irvine Operations Center.

- **Appliance Replacement:** SCE recorded $100.582 million for 2018-2022 to acquire/replace appliances. These recorded expenditures include costs for acquiring, building, configuring, and testing appliances to replace existing equipment at the end of their useful life. These expenditures fluctuate year over year due to the varying number of appliances coming to the end of their standard five-year refresh cycle. As mentioned earlier, due to the operational efficiencies gained, Hyper Converged Infrastructure (HCI) began in 2019 as a replacement for our conventional server technology. Recorded expenditures of $53.4 million for the 2019-2020 timeframe reflect the build out of the HCI infrastructure foundation, SAS Grid analytic computing environment implementation and ITRON security appliances hardware refresh. Recorded expenditures of $35.2 million for 2021 reflect Data Center backup appliance refresh and Big Data Appliance refresh. The expenditures in 2022 are attributable to the refresh of SAP Business Warehouse storage and SAP IS-U (Industry Solution for Utilities) systems.[128]
- **Organic Growth:** SCE recorded $34.527 million for 2018-2022 to meet capacity growth demand. These recorded expenditures included costs for acquiring, building, configuring, and testing midrange servers, appliances, and datacenter network components. While

[128] This refers to the infrastructure storage only and not the application.

the capacity growth line items addressed the organic growth needs of the business applications, this section also includes a corresponding capacity expansion for purposes of risk management in order to address the needed disaster recovery infrastructure to ensure the proper application failover as needed in the two co-primary production data centers—the Alhambra Data Center (ADC) and Irvine Operations Center (IOC). More specifically, when additional compute, storage, and/or network equipment was added to address organic growth, a proportional or, in some cases, an exact matching of infrastructure was provisioned and added to the appropriate disaster recovery data center location. Beyond the normal year over year growth, we had increased expenditures in 2018 due to the operational need to increase VMware and to expand capacity in Oracle Big Data Appliance. The year 2020 also experienced an increase due to storage growth in SAP IS-U (Industry Solution for Utilities) and an operational need to increase Data Center Backup storage capacity. Expenditures in 2021 were above-normal due to the operational need to increase capacity in SCE's Hyper-Converged appliances.

(b) Basis of Forecast

(i) Labor

For Test Year 2025, we forecast labor expenses of $4.604 million for this activity. This forecast includes full time employees who provide services that concentrate on the design, architecture, implementation and operations of a customer facing 24x7x365 Data Center facilities infrastructure, along with public and private Cloud administration and operations that support SCE business applications. These Test Year forecast expenses will allow for execution of the following functions:

- Design, test, provision and manage technology platforms;
- Maintenance of Data Center facilities;
- Management of the outcome of incident resolution, service requests, engineering services, and operations delivered through our managed service providers;
- Review disaster recovery strategy and technical enhancements to the Disaster Recovery Plans;
- Establish quality measures for Engineering Services; and
- Alignment of engineering design with operational standards and services.
- As shown in Figure V-27, SCE's 2020-2022 recorded expenses have been relatively stable. Therefore, SCE utilizes the last year recorded estimating methodology to form the basis of our test year forecast. The last year recorded is an appropriate basis for our test year forecast because in 2025 SCE expects a similar level of resources to execute similar activities. The $0.3 million increase in 2025 is due to the transfer of two FTEs (approximately $89,000) performing IT General Controls previously housed in Cybersecurity & IT Compliance. The remainder of the increase is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol. 04.

(ii) Non-Labor

SCE forecasts $4.767 million in the 2025 Test Year. The forecast reflected in this GRC period is derived from an itemized list of hardware assets that go beyond the five-year refresh life cycle. For a forecasted list by vendor, please see detailed workpapers.[129]

The total non-labor forecast for 2023-2028 is $31.454 million (a six-year period), which is comparable to our actual spend of $26.516 million[130] within a five-year period in 2018-2022. In 2018-2022, SCE implemented several capitalized hardware purchases with prepaid maintenance agreements that will end during 2023-2028. Unless this hardware is refreshed on the standard five-year refresh cycle, O&M costs are incurred. The forecast period reflects fluctuations in expenditures year-over-year to cover the maintenance costs for IT hardware infrastructure which has been extended beyond its standard five-year refresh life cycle.

(iii) Capital Expenditures

The forecast for capital expenditures for 2023-2028 is $426.914 million. Similar to O&M, the increases in dollars over the historical period is driven by growth in our portfolio due to various business drivers:

1. Aging technology which drives the need for replacement systems, impacting all work categories. As previously mentioned, SCE uses a five-year life cycle as an effective and operationally prudent standard to maintain IT systems reliability. Historical experience has shown that extending hardware beyond this five-year life cycle results in hardware more prone to outages. An example of this would be SAP ISU/Cloud of Customer (C4C) which replaced the legacy mainframe-based customer service system and the remainder of SAP business functions, which was maintained on an aging CISCO hardware. As we replace the aging systems, the business needs drove

[129] Refer to WP SCE-06, Vol. 01, pp. 164-165 - O&M Non-Labor Workpaper - Hardware Maintenance.

[130] Includes CSRP realized benefits of approximately $241,000 in 2021 and approximately $218,000 in 2022 (constant $). Please refer to SCE-03, Vol. 01 for discussion on CSRP benefits.

SCE to refresh our technology with new systems with additional capacity and new functionality, which then drives the cost up.

2. Data growth and the need for maturing data environments allowing for capabilities such as: self-service, improved assessment and remediation of data quality of enterprise datasets, and data archiving. These capabilities did not exist in previous systems (e.g., mainframe-based Customer Service systems). Additionally, future strategic programs such as Next Gen ERP[131] will drive additional data growth and further advancement of functionalities requiring much greater computing power, memory, and storage, which in turn significantly increases the server and storage replacement costs.
3. Wildfire mitigation has increased the need for advanced weather forecasting and modeling technology necessary to perform wildfire analysis. This has driven the need for powerful super computers significantly increasing costs in the Appliances category.
4. There is also a significant rise in the cost for IT hardware resulting in a sharp increase in costs which continue, in part, due to world supply chain issues and availability of labor and parts. For example, the Irvine Operations Data Center Network refresh was delayed by over 15 months due to hardware shortages. Additionally, those equipment costs had increased by 7 percent at the beginning of 2022.

[131] *See* Exhibit SCE 06-Vol. 02, OU Capitalized Software for a discussion on Next Gen ERP.

See below for the basis of this forecast broken down into the Data Center Infrastructure categories described in the work activities section:

- **Server Replacement:** Our forecast expenditures of $77.824 million for 2023-2028 include costs for acquiring, building, configuring, and implementing midrange servers to replace existing servers at the end of their useful life. The expenditures in the forecast period significantly increased as SCE will replace midrange servers for mission-critical systems such as SAP Business Warehouse and IS-U (Industry Solutions Utility). These systems have significantly higher computing power and memory, which increases replacement costs significantly. For example, the SAP IS-U database is 18 terabytes and is stored entirely in memory rather than stored on a disk to allow the advanced analytics to run alongside high-speed transactions. This amount of memory and transactions require faster and larger quantities of computing. SCE developed this midrange server forecast through a detailed analysis of existing midrange server assets, their useful lives, and the expected midrange server needs in this GRC period. Once SCE quantified the need (number of units) for each type of midrange server equipment category, SCE applied a unit cost to derive the total forecast for that equipment category. These unit costs were based on actual vendor quotes or an extrapolation of historical cost data for each equipment category.[132]

[132] Refer to WP SCE-06, Vol. 01, pp. 166-167 - Capital Workpapers - Server Replacement.

- **Storage Replacement:** Our forecast expenditures of $99.813 million for 2023-2028 include costs for acquiring, building, configuring, and testing storage arrays to replace existing systems at the end of their useful life. Expenditures in the forecast period will replace storage devices for mission-critical systems such as SAP Business Warehouse and IS-U (Industry Solutions Utility). The need for more historical data and greater analytics has driven the need for high performance and larger datastores. In addition, the organic growth storage is 10% year-over-year thus adding 60% more storage assets over the six-year forecast. SCE developed this storage forecast through a detailed analysis of existing storage assets, their useful lives, and the expected data growth needs in this GRC period. Once SCE quantified the need (number of units) for each type of storage equipment category, SCE applied a unit cost to derive the total forecast for that equipment category. These unit costs were based on actual vendor quotes or an extrapolation of historical cost data for each equipment category.[133]
- **Data Center Network Replacement:** The forecast expenditures for 2023-2028, totaling $74.182 million, are evenly distributed to include costs to refresh roughly 20 percent of our overall data center network infrastructure on a like-for-like basis. SCE developed this forecast through a detailed analysis of the useful life for existing data center network assets (i.e., routers, switches, firewalls, monitoring tools and load

[133] Refer to WP SCE-06, Vol. 01, pp. 168-169 - Capital Workpapers Storage Replacement.

balancers). The increase in Appliances, Servers, and Storage categories in sections above is necessary to support the growth in SAP and other mission-critical systems which then increases the need for more network assets described in this forecast. SCE applied unit costs for each equipment type in order to derive the total forecast expenditure during 2023-2028. These unit costs were based on actual vendor quotes or an extrapolation of historical cost data for each equipment type.[134]

- **Appliance Replacement:** Our forecast expenditures of $143.648 million for 2023-2028 include costs for acquiring, building, configuring, and implementing appliances to replace existing midrange servers and storage devices at the end of their useful life. The expenditures in the forecast period will replace existing Hyper-Converged, Exadata, Itron and Weather system appliances for mission-critical systems such as Design Manager, Outage Management System, Weather Prediction System and Smart Meter System. Forecasts for 2025 are higher than normal due to an operational need to refresh the meter data management (MDMS) Itron security devices which are critical to the support and reliability of SCE.com. SCE developed this appliance replacement forecast through a detailed analysis of existing assets, their useful lives, and the expected needs in this GRC period.[135]

[134] Refer to WP SCE-06, Vol. 01, pp. 170-172 - Capital Workpaper Data Center Network Replacement.

[135] Refer to WP SCE-06, Vol. 01, pp. 173-174 - Capital Workpapers Appliance Replacement.

- **Organic Growth:** Our forecast expenditures of $31.446 million for 2023-2028 include costs for acquiring, building, configuring, and testing midrange servers, appliances, and datacenter network components required to meet the organic growth. Due to the nature of these appliance models, such as HANA, Hyper-Converged appliances, and Exadata, capacities are procured in pre-configured increments and therefore organic growth hardware outlays are increased. These projected costs are based on actual vendor quotes or an extrapolation of historical cost data for each equipment category.[136]

b) End User Computing Maintenance, Services & Replacement

(1) Work Description

This sub-work activity includes three types of O&M costs. First, it includes service operations labor which is responsible for monitoring and managing the MSPs' performance, specifically for the End User Computing & Service functions referenced in section V.A (Fixed Price Technology & Maintenance). IT End User Computing employees consistently engage SCE employees to address issue escalations and elicit requirements for ad-hoc requests and project consultations. Second, this sub-work activity includes the management of the third-party vendor contractual obligations and performance for cellular and wireless, product ordering, printing, audio and visual. Finally, it includes the management of cellular devices and monthly plans, software licensing renewals, computer accessories, and printers.

In addition to the O&M expenses, this sub-work activity encompasses capital expenditures in the form of refreshing devices for both office and field workers. Office workers are provided with PCs to carry out routine tasks, including email, timesheets, word processing, budgeting activities, and using business-related applications. Employees whose jobs require them to support multiple locations or work remotely after hours are provided a standard laptop; all other employees receive a desktop PC and monitor. Field employees (Troublemen, Linemen, Apparatus

[136] Refer to WP SCE-06, Vol. 01, pp. 175-176 - Capital Workpapers Organic Growth.

teams) are provided with ruggedized devices[137] to respond to distribution and transmission line issues. Advances in technology and improvements in business processes have enabled up-to-date electronically stored information to replace potentially outdated paper versions for work in the field. The ruggedized laptop deployment was expanded to include Transmission Patrolmen, Substation Technicians, Field Service Representatives, and Meter Technicians in 2017.

(2) Need for Activity

This activity is necessary for a variety of reasons. First, oversight of MSPs and third-party vendors is necessary because it provides an understanding of the business impacts of the issues being worked on by the MSPs and third-party vendors. Additionally, it confirms that the quality of the work being performed meets the standards and requirements of end users.

Second, with advances in technology and with recent wildfire events, office and field workers are requiring PCs that are more powerful and more reliable in order to support complex applications for mapping, outage management, and engineering design and modeling.

Third, refresh of PCs, monitors, computer accessories, and audio & visual (AV) equipment, is necessary as a result of age and technology obsolescence. Even though a PC's durability and capabilities have increased year over year allowing us to expand their useful life, expansive data and computing requirements of the business application portfolio have required a refresh rate of every three years. Mobile and remote workforce requirements have increased over the years, driving our current PC environment to 69% laptops, 12% Desktops, and 19% iPads.

Fourth, business in the field requires up-to-date 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, while also providing a more efficient means to house and retrieve the vast documentation that employees may need to reference in the field (for up-to-date safety procedures, troubleshooting, etc.). 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 challenging field environment includes travel over rough terrain and in inclement weather. Ruggedized laptops are built to operate under these extreme

[137] Refer to WP SCE-06, Vol. 01, pp. 177-179 - Rugged Device Lifecycle.

conditions. The devices have been tested to operate in adverse working conditions. Cellular modems provide wireless connectivity for work dispatch, and global positioning system receivers enable street mapping software so crews can locate work sites. Just as with the office environment PCs, one of the most significant drivers for the refresh of ruggedized laptops is end-of-life, which is addressed on a four-year plan for model releases. How computing devices will be used guides how PCs and laptops are distributed.

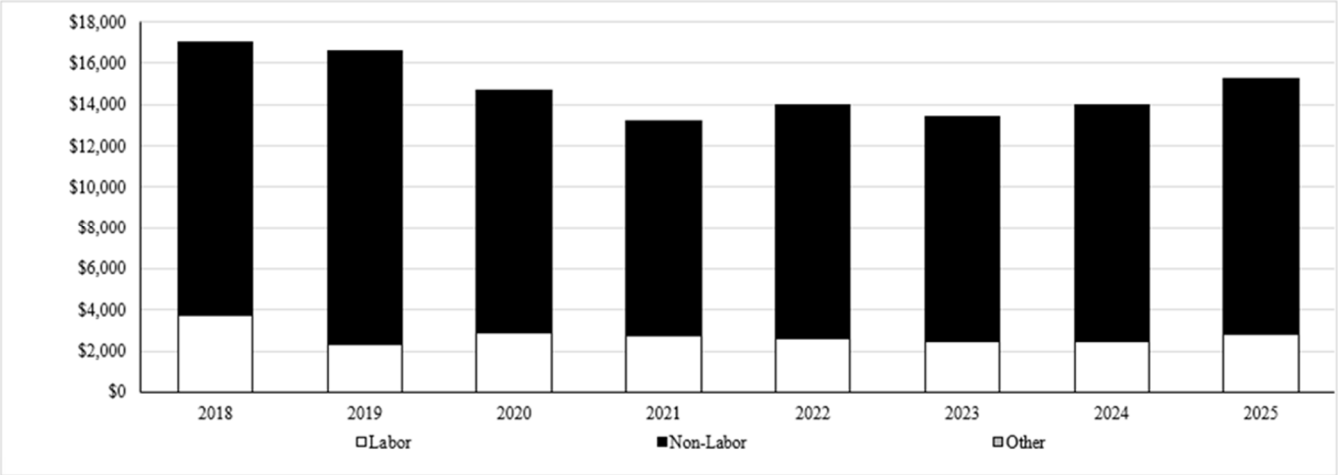
The benefits of this sub-activity include replacing end-of-life devices with more modern hardware and software. If this sub-activity is not performed, there will be more operational interruptions for office and field employees due to aging devices. Aging devices can cause performance issues, therefore increasing interruptions for end user activities. Additionally, a reasonable refresh program that replaces devices on a scheduled basis is an important part of providing safe and reliable service to our customers, including ensuring emergency readiness.[138]

(3) Scope & Forecast Analysis

Figure V-29 provides 2018-2022 recorded costs and 2023-2025 forecast O&M expenses, broken down by labor and non-labor for the End User Computing Maintenance, Services & Replacement sub-work activity.

[138] Refer to WP SCE-06, Vol. 01, pp. 180-181 - PC Purchase lifecycle.

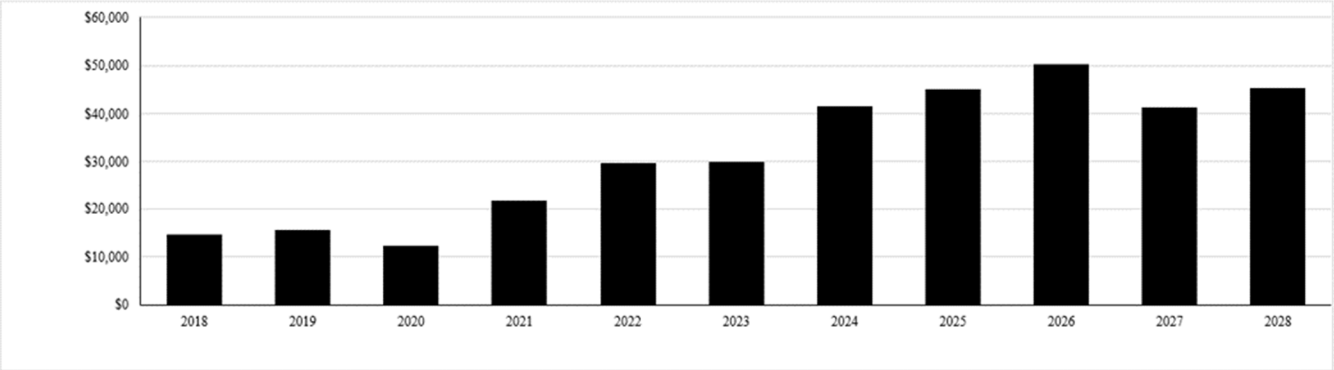
Figure V-29
End User Computing O&M Expenses
2018-2022 Recorded / 2023-2025 Forecast
(Constant 2022 $000)



	Recorded					Forecast		
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Labor	$3,750	$2,309	$2,889	$2,764	$2,573	$2,430	$2,495	$2,830
Non-Labor	$13,243	$14,313	$11,799	$10,436	$11,434	$10,999	$11,483	$12,404
Other								
Total Expenses	**$16,993**	**$16,622**	**$14,688**	**$13,201**	**$14,008**	**$13,429**	**$13,978**	**$15,234**

Figure V-30 provides 2018-2022 recorded costs and 2023-2028 forecast capital expenditures for the End User Computing Maintenance, Services & Replacement sub-work activity.

Figure V-30
End User Computing Capital Expenditures
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
End User Computing Maintenance, Ser	$14,554	$15,574	$12,272	$21,611	$29,560	$29,837	$41,316	$44,994	$50,041	$41,291	$45,176
Totals	**$14,554**	**$15,574**	**$12,272**	**$21,611**	**$29,560**	**$29,837**	**$41,316**	**$44,994**	**$50,041**	**$41,291**	**$45,176**

(a) Historical Variance Analysis

(i) Labor

Labor costs decreased from $3.750 million in 2018 to $2.309 million in 2019 due to re-organization of employees performing field support services out of this sub-work activity into other areas of SMOO for better organization alignment. The increase of $0.580 million in 2020 is attributable to costs for professional trainees and the filling of two positions that support end user computing critical operations and requirements elicitation for various requests to make improvements to our services. In 2021 and 2022, the variations in costs are due to normal attrition and timing of position restaffing.

(ii) Non-Labor

From 2018 to 2019, non-labor costs for this sub-work activity increased from $13.243 million to $14.313 million due to increases in wireless plan purchases to support wildfire mitigation requirements.

From 2019 to 2020, non-labor expenses significantly decreased to $11.799 million due to wireless plan contract renewals, which provided monthly savings, and the decommissioning of pager devices and their related contract.

Expenses then continued to significantly decrease in 2021 to $10.436 million due to the renegotiation of wireless plans and optimization of services in support of the remote working activities during the pandemic.

2022 non-labor expenses then increased slightly to $11.434 million due to business demands for wireless plans to support new hires. These new employees were hired in support of wildfire, vegetation management, Public Safety Power Shutoff (PSPS), Air Ops, and Off-cycling Inspection activities.

(iii) Capital Expenditures

From 2018-2022, the refresh of devices, the growth of the end user population, and the need for remote working due to the pandemic significantly impacted capital expenses.

From 2018-2019, the capital expenses increased from $14.554 million to $15.574 million due to increases in device purchases (e.g., laptops, phones, radios) in support of wildfire initiatives.

In 2020, we saw a decrease in capital expenditures to $12.272 million. Due to the pandemic, SCE purchased a small volume of new devices and utilized refurbished devices to fulfill the emergent needs of remote working, rather than executing planned refreshes or break fixes. As this small number of new and refurbished devices are cheaper than planned refreshes, this resulted in the decrease of capital expenditures for the year. Other factors that contributed to the spend is the global chip shortage, which decreased the supply of devices.

From 2020-2021, the capital expenses increased significantly to $21.611 million due to SCE-initiated implementation of video walls to surveille and monitor the status of substations and command centers, and the replacement of refurbished devices.

Lastly, in 2022, this sub work activity incurred significant costs as we ramped up device refresh activities that were on hold in 2020 due to the pandemic (including Motorola radios), continuation of the video wall implementation,[139] refresh of conference room equipment, the effort to return employees back to the office, which increased demands to replace and refresh devices and accessories, and growth of new hire employees across SCE Organizational Units.

[139] *See* Exhibit SCE-06, Vol. 01, Part 1.

(b) Basis of Forecast

(i) Labor

For Test Year 2025, we forecast labor expenses of $2.830 million for this activity. This forecast represents the need for full time employees to manage MSP performance and the completion of activities as per contract commitments. It also includes activities for issue resolutions with third party vendors when necessary. These Test Year forecast expenses will allow for execution of the following functions:

- Management of Service Desk;
- Management of end user computing resources (e.g., desktop support);
- Management of Field Services;
- Management of desktop engineering function;
- Management of wireless support;
- Management of radios and satellite phones support; and
- Management of Audio and visual services.

As shown in Figure V-29, SCE's 2019-2022 recorded expenses have been relatively stable. Therefore, SCE utilizes the last year recorded estimating methodology to form the basis of our test year forecast. The last year recorded is an appropriate basis for our test year forecast because in 2025 SCE expects a similar level of resources to execute similar activities. The labor costs are expected to remain flat from 2025 to 2028 due to stabilization of the working model with our managed services vendors, as well as aggressively managing service costs. The $0.256 million increase in 2025 from 2022 recorded is due to backfilling vacant positions (service desk manager and end user computing service advisor roles). The remainder of the increase is attributable to an adjustment to reflect certain changes made to SCE's employee compensation program. Please refer to SCE-06, Vol. 04.

(ii) Non-Labor

For Test Year 2025, we forecast non-labor expenses of $12.404 million for maintenance of 8,500 smart phone plans, 10,000 tablet cellular data and Apple Care, 3,500 air cards, 885 printers, 17,200 laptops and desktops, and 1,020 teleconference rooms with AV equipment across the company. This forecast is a minor increase from 2022 recorded expenses of

$11.434 million, which is derived from an itemized list of assets maintained. For a forecasted list by assets, please see detailed workpapers.[140]

(iii) Capital Expenditures

For capital expenditures, we forecast a total of $252.655 million for 2023-2028. SCE developed its 2023-2028 forecast for this sub-work activity through a detailed analysis of the useful life of PCs, desktops, laptops, plotters, and monitors, and the expected refresh requirements (including Windows 11, Emergency Command Centers, and training room refreshes), in this GRC period.

Increasing needs in the business for rugged and high-performance devices, as well as enterprise programs and OU needs (such as Corporate Real Estate projects, Windows 11 Refresh projects, and Wildfire Initiatives),[141] have driven the purchase of thousands of new devices, monitors, and audio-visual equipment. One significant driver for this GRC forecast period is the increases of tablet purchases for field operations. Whereas before, field workers were conducting field activities with clipboards and paper, increasing digitization of records drove the shift to field workers conducting these activities with tablets, which in turn increases tablet devices in our portfolio. This shift allows for greater efficiency in operational activities and ensures accuracy of our records. These drivers combined, in turn, increase the refresh costs due to device lifecycle and device costs. Although we strive to use the lowest cost options (e.g., provisioning refurbished equipment), this sub-work activity will incur increased outer year charges from 2023-2028 in order to refresh the purchased equipment.

SCE forecasts the cost for all devices and the cost of refreshes based on the number of units in our current environment. SCE then applied a unit cost, which is based on actual vendor quotes or an extrapolation of historical cost data for each equipment category type, to the unit forecast by year, to arrive at the End User Computing forecast.[142]

Another significant driver of the cost in the forecast period of 2023-2028 is the Windows 11 Program. The focus of the Windows 11 Program is to upgrade our current Windows-based operating systems from Windows 10 to a single modern platform, Windows 11,

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[140] Refer to WP SCE-06, Vol. 01, pp. 182-187 - End User Computing Non-Labor Workpaper.

[141] *See* Testimony for CRE projects in Exhibit SCE-06, Vol. 07 and Testimony for Wildfire Management in Exhibit SCE-04, Vol. 05, Parts 1-4.

[142] Refer to WP SCE-06, Vol. 01, pp. 188-193 - End User Computing Capital Forecast.

which will enable significant performance improvements. In the last GRC, SCE was authorized funds to upgrade to the Windows 10 operating system.[143] This project spans the entire SCE enterprise and employee base. SCE has adopted the Microsoft platform as the corporate standard to provide core capabilities such as email, chat, phone, collaboration, word processing, spreadsheet data analysis, and information presentation. Staying current with the Windows platform by upgrading to the next version allows SCE to be in alignment with our internal computing strategies as well as the Microsoft Enterprise Strategy. This is important in order to take full advantage of the maintenance and service offerings in our contract with Microsoft. Windows 11 will simplify the desktop experience and provide a consistent computing experience across phones, tablets, and PCs, making our employees more responsive and productive. It will also provide current enterprise-grade security to help protect against modern threats and simplify the management of both corporate and employee-owned devices on our network.

It is necessary to implement Windows 11 now in order to avoid increased costs from the Windows 10 Operating System which reaches end of life in 2025. To ensure continued vendor support, operational stability, and cybersecurity compliance, Windows 10 needs to be replaced in all areas of SCE. SCE will also face similar issues in coming years with the other Windows operating systems that followed Windows 10; deploying Windows 11 now will prevent those issues from occurring as well. The benefits to this project include:

- Enhanced productivity, security, and tools that will advance the way we work;
- Standardization of the Windows Operating System enterprise-wide;
- Provision of enterprise-grade cybersecurity; and
- Avoided cost savings in hardware refresh, software license, and maintenance upgrade costs by upgrading these operating systems to one standardized Windows platform.

The total 2023-2028 forecast for this project is $33.607 million.[144] The capital forecast was developed using SCE's internal cost estimation model. This model

[143] *See* 2021 Exhibit SCE 06, Vol. 01, Part 2, OU Capitalized Software.

[144] Refer to WP SCE-06, Vol. 01, pp. 194-195 - Windows 11 Summary and WP SCE-06, Vol. 01, pp. 196-198 - Windows 11 Deployment Cost Plan Workpapers.

utilizes industry best practices and SCE subject matter expertise to estimate project cost components. SCE's forecast for this project includes costs for SCE employees, supplemental workers and consultants, software and vendor costs, and hardware costs.

c) Technology Adoption

(1) Work Activity Description

The Technology Adoption sub-work activity consists of the retirement of computer, storage, network, and operating software assets no longer aligned with SCE's strategic roadmap. It also includes the replacement of these assets with hardware and operating software aligned with SCE's strategic direction to: (1) leverage cloud computing and cloud-hosted software-as-a-service (SaaS) subscriptions; and (2) increase on-premise data center virtualized compute, network, and storage by bringing cloud service provider managed infrastructure to SCE data centers.

Activities within this sub-work activity include: (1) improving cloud foundational areas in order to increase reliability, cyber security, and identity and access management; and (2) migrating and re-platforming the resident applications to technologies aligned with SCE's cloud strategy. For example, SCE.com was migrated to the cloud adding greater scalability, reliability, security, and business capabilities such as analytics and future AI/ML capabilities. All of these capabilities were not available or were not feasible on premises.

As previously discussed, as SCE continues its adoption of cloud technologies, the focus over 2023-2028 will be on Cloud Transition, Business Resiliency, Automation, Cost Management, Compliance and Identity Management.

In furtherance of these focus areas, SCE plans for the acquisition and implementation of the following cloud capabilities, which will be capitalized over 2023-2028:

- **Cloud Transition.** Cloud platforms will physically reside inside SCE data centers. In order to successfully transition from on-premise based applications and databases, SCE will deploy a next generation on-premise cloud platform, provided and managed by a world-class cloud service provider, which extends to SCE data centers by public cloud hosting on their hardware and software infrastructure seamlessly without a major re-architecture. Cloud computing will not only be a technological approach for delivering applications but will also serve as the key driver for business innovation since increasingly new

capabilities are available primarily through cloud services and not on premises.[145]

- **Business Resiliency.** Integration of existing on-premise backup systems with cloud service provider backup systems provides single view of backup related activities across the enterprise. Multi-regional Disaster Recovery enables SCE to recover from catastrophic failures by the cloud service provider in a geographic region.
- **Automation.** SCE will use the special abilities of the cloud to automatically enforce certain standards for security, operations, and architecture. This can help reduce the amount of work that needs to be done by people to review these things, and it can also be used at any time after the solution has been built to keep proving the solution is following standards without needing that much extra work.
- **Cost Management.** Continuously improving cost management by leveraging cloud native granular cost management capabilities results in more efficient use of resources. Placement of cost limits and granular reporting enable automated cost controls and visibility.
- **Compliance.** Enable industry standard built-in policies and reporting across all cloud platforms.
- **Identity Management.** Cloud services are significantly faster to deploy and much greater automation than is technically feasible with on-premise based traditional solutions. Additionally, the virtual deployments in the cloud result in very significant power that also can quickly cause significant harm such as ransomware attacks. The identity management must therefore be automated with built-in role-based access controls enforcement and monitoring.

[145] Refer to WP SCE-06, Vol. 01, pp. 199-201 - "The Future of Cloud Computing in 2027: From Technology to Business Innovation," Gartner, David Smith, Dennis Smith, 5 October 2022.

(2) Need for Activity

Adoption of the technologies previously described are advantageous for several reasons.

First, the migration to cloud-based services infrastructure mitigates the impact of hardware and software obsolescence, while providing better reliability, scalability, agility, and significantly more services and functionality to choose from. For example, Cloud SaaS systems support Asset Inspections providing automated identification of poles in need of maintenance by processing hundreds of thousands of asset inspection images collected by drones and other aerial platforms. This level of computing and Artificial Intelligence would not be possible with on-premise systems. Additionally, the hardware infrastructure will be the responsibility of the cloud-services provider and software companies are now moving towards cloud-based solutions that can take advantage of cloud scalability, reliability and security. Typically, as hardware assets move into obsolescence, they generate more failures, create more compatibility issues, introduce more security vulnerabilities, and ultimately result in more outages. Shifting responsibility to the cloud services provider mitigates risk to the customer base by providing fundamental built-in security improvements. In addition, there will be reduced hardware maintenance and support costs. A "cloud smart" transition strategy requires being prudent about cloud migration costs and gradually transforming the workforce. Most SCE applications are architected to take advantage of very close proximities to other applications and data sources. This means that cloud transition typically requires relatively expensive re-architecture costs in most cases and bringing a cloud service platform to SCE data centers allows a more gradual transition to the cloud by allowing the existing architectures to stay in place while gradually incorporating additional cloud services that are available that can be physically located in the data center itself.

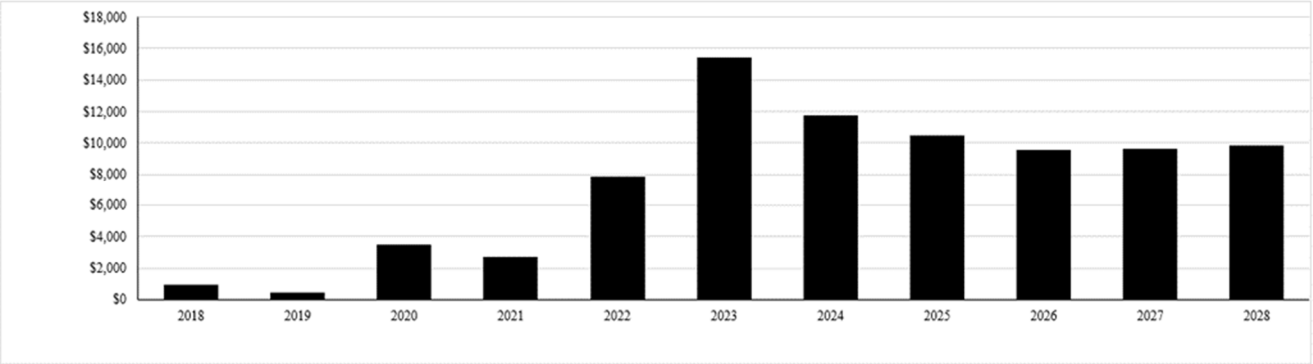
Second, SCE has implemented the foundation for two major cloud service providers and is adding a third cloud service provider as part of its multi-cloud strategy in order to have the best solution options available using the top-three cloud service providers. As SCE's cloud presence increases, further steps are needed to improve automation to take further advantage of technology enhancements available in the cloud at a much faster rate than can be deployed in a traditional software lifecycle. In addition, as SCE continues to move applications and data from on-premise to the cloud, there is a greater need to mature our compliance and cost management to improve these foundational areas, which also allows SCE to improve reliability and cybersecurity at a faster rate than could otherwise be deployed in a traditional software lifecycle.

Lastly, Technology Adoption's implementation of Identity & Access Management cloud capabilities through the Identity Management program will enable SCE end users to navigate through the various SCE cloud applications and services seamlessly, while adding the needed level of security protection for SCE's assets and information. As part of Technology Adoption, there will also be an integration of Identity Artificial Intelligence (Identity AI) to better enable SCE to manage risk and security and improve decision making relative to access being granted to end users.

(3) Scope & Forecast Analysis

Figure V-31 provides 2018-2022 recorded and 2023-2028 forecast capital expenditures for the Technology Adoption sub-work activity.

Figure V-31
Technology Adoption Capital Expenditures
2018-2022 Recorded / 2023-2028 Forecast
(Nominal $000)



	Recorded					Forecast					
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Technology Adoption	$914	$429	$3,442	$2,681	$7,834	$15,379	$11,685	$10,457	$9,503	$9,582	$9,812
Totals	$914	$429	$3,442	$2,681	$7,834	$15,379	$11,685	$10,457	$9,503	$9,582	$9,812

(a) Historical Variance Analysis

(i) Capital Expenditures

From 2018 to 2022, the recorded capital expenditures for the Technology Adoption sub-work activity were $15.300 million. The main drivers were the build out of the Cloud foundation, the Identity Management implementation, and the Data Lake solution.

- **Cloud:** Recorded expenditures of $2.5 million for 2018-2022 to reflect the build out of the Cloud Foundation.

- **Data Lake**: Recorded expenditures of $6.3 million for 2020-2022 to reflect the migration of Hadoop platform to Snowflake Cloud Platform.
- **Identity Management:** Recorded expenditures of $6.394 million for 2018-2022 to reflect single-sign-on for cloud applications and SailPoint Identity IQ for an identity governance solution linking people, business applications, data and devices, which created an identity-enabled enterprise.

(b) Basis of Forecast

(i) Capital Expenditures

Our forecast for capital expenditures is $66.418 million for 2023-2028. The higher forecast expenditures are due to the need to complete the migration of the Data Center Data platform to the Cloud Data Platform. This growth in SCE's Cloud platforms will require enhanced disaster recovery and business resiliency strategies, as well as greater automation, cost management, compliance, and identity governance. This forecast can be broken down[146] into the following functional capabilities:

- Cloud Transition - $41.738 million
- Business Resiliency - $1.500 million
- Automation - $1.350 million
- Cost Management - $0.500 million
- Compliance - $4.000 million
- Identity Management - $17.329 million

The forecast spending for these functional capabilities is detailed further in the following paragraphs.

Cloud Transition. Bringing cloud platforms to SCE data centers allows for seamless transition to cloud from existing SCE applications by enabling tightly coupled access to existing hardware appliances that require time to move to cloud. This requires foundational setup for the platform, and migration of applications from existing infrastructure and data

[146] Refer to WP SCE-06, Vol. 01, pp. 202-203 - Capital Workpapers Technology Adoption.

sources. Expenditures in the forecast period will fund the completion of the migration from Data Center Data Platform to Cloud Data Platform. Expenditures will also fund the migration of applications and transformation of legacy on-premise based database technologies to next generation cloud database technologies.

Business Resiliency. Cloud services have significant backup and archive capabilities built in which must be integrated with on-premise monitoring and reporting systems for more seamless reporting. Cloud service providers offer a distinct advantage of having hundreds of data centers across the United States, and SCE can take advantage of those in the event of a catastrophic event on the West Coast. Expenditures in the forecast period will fund the implementation of a multi-regional disaster recovery strategy for essential business applications which will be migrated to the cloud.

Automation. SCE will leverage cloud native automation and enforce tools to ensure compliance to design, construction, security, and operational standards. Expenditures for the forecast period will fund the implementation of the foundational capability for self-service to business users for cloud services including Artificial Intelligence model development and advanced analytics.

Cost Management. To better manage costs, SCE will seek improvements of Cost Transparency and Cost Management Tool Maturity to take advantage of cloud native cost tracking granularity and more effectively manage cloud costs across the Enterprise for SaaS and PaaS/IaaS solutions. Expenditures for the forecast period will fund the implementation of instant show-back self-service capabilities allowing internal business clients to understand costs of their products hosted in the cloud.

Compliance. SCE will leverage cloud native capabilities for architecture and operational compliance to significantly reduce or eliminate manual reviews of architectures and designs prior to actual deployments. Expenditures for the forecast period will fund the foundational deployment of a special purpose cloud that is specialized for the highest public cloud non-classified usage that will be applied for grid related services.

Identity Management. SCE will continue to improve automated capabilities for identity governance of access management and deploy an analytics data warehouse as part of its overall cybersecurity architecture. Expenditures for the forecast period will fund

the consolidation of both major internet domains and the completion of integrating all SCE applications with Identity Governance systems.