

2021

BUDGET AND GRID MANAGEMENT CHARGE RATES

Prepared by the Financial Planning and Procurement Department
California Independent System Operator Corporation



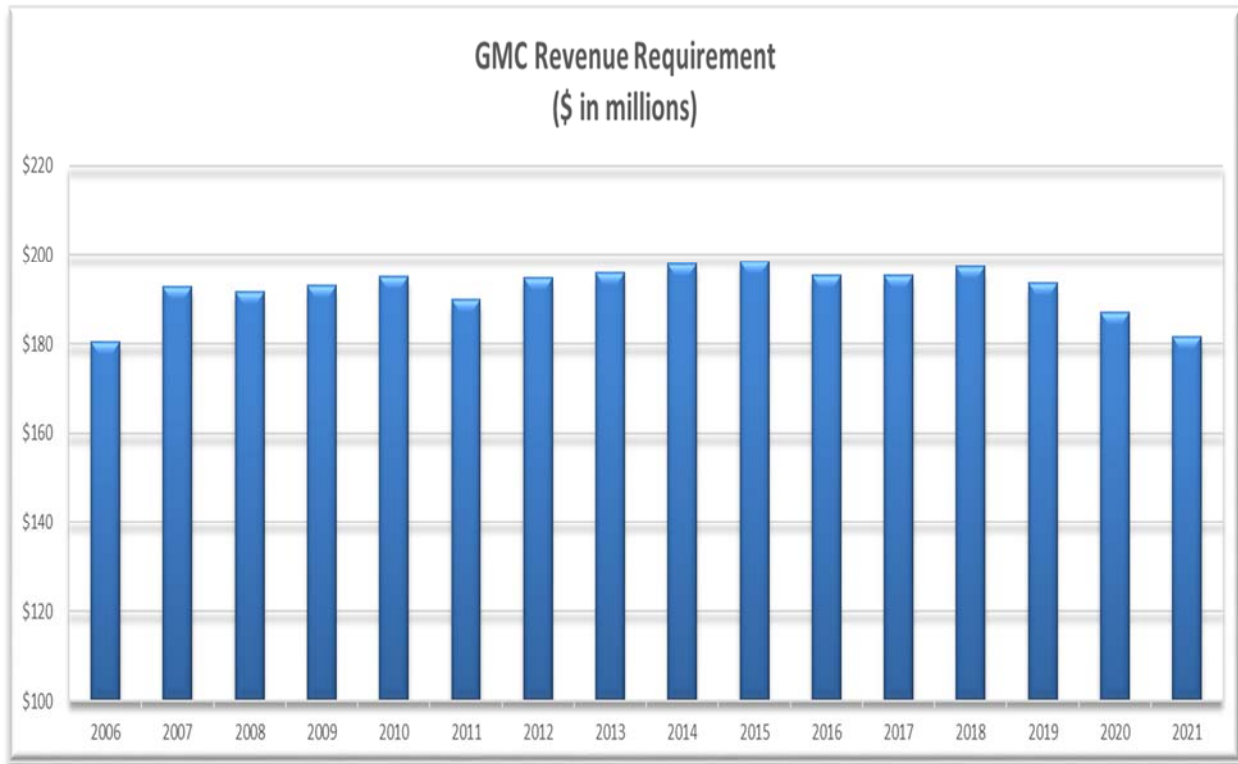
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I. 2021 GMC Revenue Requirement Summary

The 2021 grid management charge (GMC) revenue requirement, the means in which the ISO recovers its net operating costs, is \$181.6 million. The 2021 GMC revenue requirement represents a 3% decrease from 2020 and it is the lowest revenue requirement since 2006. As evidenced by the continued stability of the GMC revenue requirement, fiscal discipline remains a priority for the California Independent System Operator Corporation (ISO). The ISO has absorbed several major initiatives during this time with no material impact to the GMC revenue requirement, which included launching the market redesign and technology upgrade (MRTU), constructing its secure primary and secondary locations, implementing the energy management system (EMS), as well as launching the Western Energy Imbalance Market (EIM) and reliability coordinator services (also known as RC West).



2019 Cost of Service Study and 2021 GMC Update

The ISO completed its scheduled triennial cost of service study in 2020¹, in accordance with its tariff. The study used activity based costing to analyze cost and time data from 2019 to determine how much time and effort staff uses to support varying cost categories and supplemental services. The updated cost percentage allocations and fees, as a result of the cost of service study, will be used to develop the 2021 through 2023 GMC revenue requirement and resulting charges. The updated cost category allocation percentages are used to allocate the revenue requirement to the market services, system operations, and congestion revenue rights (CRR) services. The study results are also used to update the energy imbalance market cost category percentages and the recently developed reliability coordinator (RC) funding percentage. In addition, as part of the cost of service study, the ISO analyzed its cost to support supplemental services. The analysis of the supplemental services and its fees supports changes to some of the fees. The updated percentages and fees are discussed throughout the sections to follow.

Components of 2021 GMC Revenue Requirement

A summary of the 2021 GMC revenue requirement compared to 2020 follows.

GMC Revenue Requirement (\$ in millions)	2021 Budget	2020 Budget	Change \$	Change %
Operations & Maintenance Budget	\$200.8	\$195.0	\$5.8	3%
Debt Service (including 25% reserve)	16.9	16.9	0.0	0%
Cash Funded Capital	28.0	28.0	0.0	0%
Other Costs and Revenues	(50.5)	(41.3)	(9.2)	22%
Operating Costs Reserve Adjustment	(13.6)	(11.6)	(2.0)	17%
Total GMC Revenue Requirement	\$181.6	\$187.0	(\$5.4)	-3%
Transmission Volume Estimate in TWh	237.3	238.4	(1.1)	0%
Pro-forma bundled cost per MWh	\$0.7653	\$0.7844	(\$0.0191)	-2%

¹ The 2019 cost of service study and accompanying documentation is available on the ISO website at <http://www.caiso.com/informed/Pages/StakeholderProcesses/Budget-GridManagementCharge.aspx>

The operations and maintenance (O&M) budget is the largest component of the GMC revenue requirement; therefore, managing it is critical to keeping a stable revenue requirement. The \$5.8 million projected increase in the O&M budget is primarily due to budgeted merit and other compensation increases, additional headcount, additional consultant and contract staff, and reliability coordinator tools. The budgeted headcount will increase by 10 to 658.

Despite the increases in the O&M budget, the overall GMC revenue requirement will decline by \$5.4 million from 2020 as other revenue is budgeted to increase by approximately \$9.2 million combined in 2021. In addition, the 2020 operating cost reserve credit will increase by \$2 million.

The ISO projects that the 2021 transmission volumes will be 237.3 TWh, which is a decrease from projected 2020 volumes. The projected volumes are based on the three-year average of actual measured demand volumes as well as year-to-date 2020 volumes. Dividing the GMC revenue requirement by the projected volumes results in a pro-forma bundled cost per megawatt-hour (MWh) of \$0.7653, or a 2% decrease from 2020.

The pro-forma bundled cost per MWh does not represent a single charge that the ISO uses, but is intended rather to represent a combination of charges a market participant could expect to pay if they utilized all of our grid management services, including: market services, system operations, and congestion revenue rights services. See Section X at the end of this document for the actual calculation of the rates.

II. Budget Overview

This budget package consists of the following items:

- O&M budget (Sections III thru V)
- Debt service costs (Section VI)
- Capital / project funding and cash-funded capital (Section VII)
- Other costs and revenues (Section VIII)
- Operating cost reserve adjustment (Section IX)
- Grid management charge components (Section X).

The O&M budget, the primary focus of this report, is the largest of these components and consists of the costs incurred for annual operations. The 2021 O&M budget of \$200.8 million is \$5.8 million greater than the 2020 O&M budget of \$195.0 million. The O&M budget is presented in three separate views as noted below:

- By process — e.g., support customers and stakeholders (Section III)
- By resource — e.g., salaries and benefits (Section IV)
- By division — e.g., the Operations division (Section V).

Debt service costs are the principal and interest payments related to the 2013 bonds, and the collection of a 25% debt service reserve. The 2013 bonds refinanced the 2009 bonds which the ISO issued to build a new headquarters facility in Folsom, California and funded other capital expenditures. The total debt service to collect in the 2021 GMC revenue requirement remains \$16.9 million.

Cash-funded capital included in the GMC revenue requirement is \$28 million with any unencumbered amounts carried over to fund future years' capital requirements. Collecting capital as a component of the GMC revenue requirement avoids the additional costs associated with debt financing, including issuance costs, interest expense, and debt service reserves. The capital / project requirements for 2021 are projected to be \$22 million and will be funded by the cash-funded capital amount described above.

Other costs and revenues are net revenues received from sources other than the GMC and reduce the overall GMC revenue requirement. They are budgeted to increase \$9.2 million in 2021 to \$50.5 million. These other revenues include items such as EIM administrative charges, reliability coordinator funding requirement, intermittent resource forecasting fees, interest earnings, California-Oregon intertie path operator fees, generator interconnection fees, and, new to 2021, the nodal pricing model fee.

The operating cost reserve adjustment is a credit of \$13.6 million in 2021. In any year that the ISO operating reserve account exceeds 15% of the prospective year's O&M budget, the excess reduces the GMC revenue requirement for the following year. This adjustment also includes the 25% debt service reserve collected in 2020 and the difference between the budgeted and actual revenues and expenses from 2019.

Budget Guidance

The ISO's budget is collaboratively developed using feedback from its stakeholders and leadership team. The ISO held its initial 2021 stakeholder meeting in July 2020 to allow for stakeholder input prior to building the 2021 budget; a follow up meeting was held in November 2020. Notes from both meetings are available on the ISO website².

Following its firm commitment to fiscal responsibility, the ISO utilizes the Zero-Based Budgeting (ZBB) method to develop its O&M budget. ZBB confronts conventional thinking and resource allocations by challenging every line item and assumption. Budget requests under the ZBB method require justification which helps us avoid over-budgeting, double counting, and automatic budget increases. The result is a well justified and balanced budget which is strategically aligned with the ISO's focus going into the year.

The combined efforts contributed to the 2021 GMC revenue requirement to come in at \$181.6 million, approximately \$20.4 million less than the FERC approved \$202 million cap. The budget funds operations and initiatives are set forth in the ISO vision as described below.

Strategic Outlook

The ISO's strategic objectives include reliably operating the grid, efficiently operating ISO markets, and continuing the pursuit of organizational excellence.

Our top priority remains managing a highly reliable electric grid in an efficient, non-discriminatory way, using our market to provide customers with the best value from transmission and generation resources. As the grid continues to evolve and the Western energy market expands, it is crucial that we continue to maintain and grow the confidence of stakeholders, participants and policy makers in the performance, quality and integrity of the ISO market.

² The 2021 Budget and Grid Management Charge documentation and stakeholder feedback is available on the ISO website at <http://www.caiso.com/informed/Pages/StakeholderProcesses/Budget-GridManagementCharge.aspx>.

In 2020, the ISO transitioned under a new CEO, announced the retirement of two of its key executives, and announced the creation of a new Chief Operating Officer position³. Despite the changes, the ISO remains steadfast to maintain its legacy of organizational excellence. It will target improvements and excellence in the areas of technology, compliance, customer service, a productive and inclusive workforce, and fiscal responsibility.

Aligning with the ISO's Vision

The ISO remains committed to supporting growth and change while carefully managing its operating costs. Over the past several years, the ISO has enhanced the grid to become more flexible and adaptable, as very low and zero-carbon resources are added to the system to meet state clean air and water goals.

The budget aligns with the ISO's Strategic Vision, which is a guide to meet organizational and operational goals. The plan contains the following strategies:

1. Reliable management of the grid,
2. Efficient operation of the ISO markets, and
3. Continued pursuit of operational excellence.

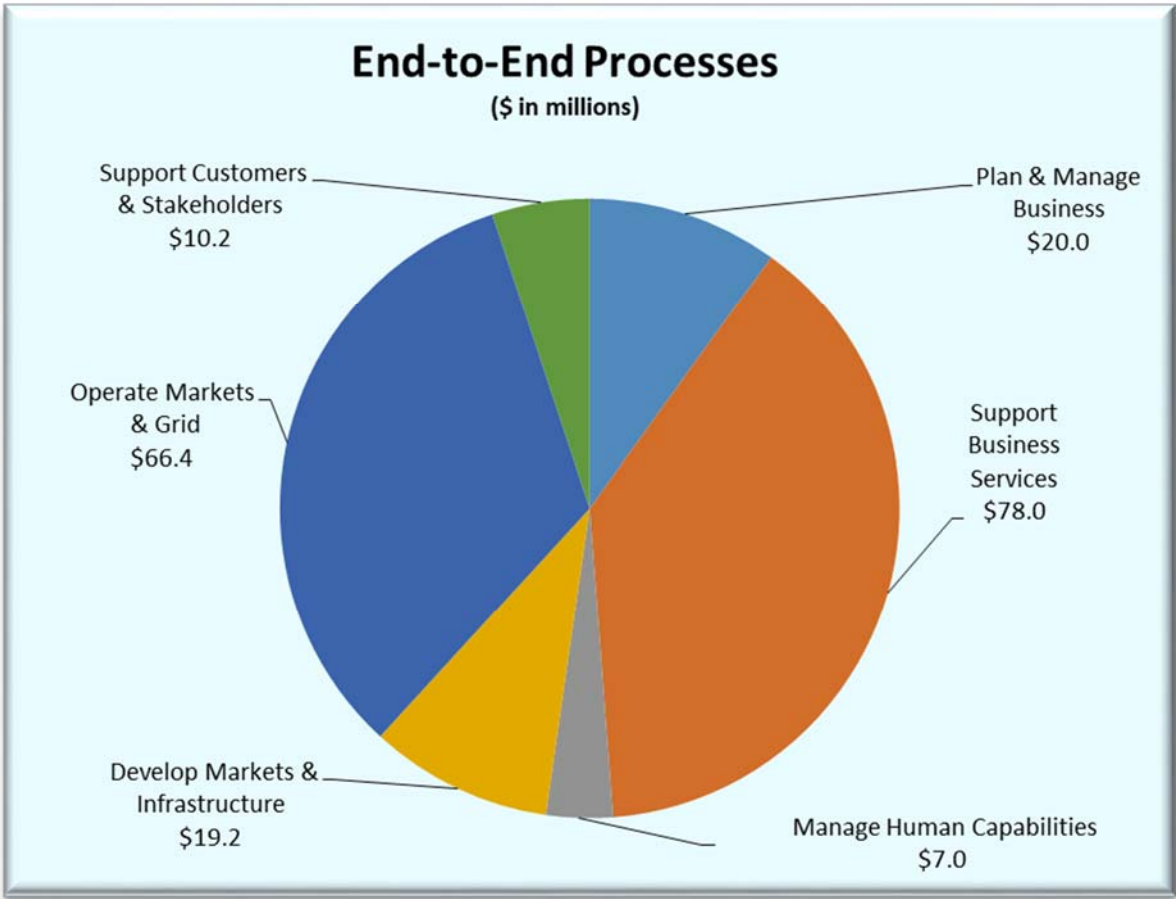
The Strategic Vision provides employees and managers our common goals while the budget explains how the corporation funds and allocates its resources to support its business plans. The budget is built upon a balanced mix of staffing, skills and financial resources.

Aligning the strategic planning process with budget planning provides greater transparency into the ISO's resources and business and operation costs. The ISO remains steadfast in its efforts to manage costs and utilize corporate resources in a smart and prudent manner.

³ The ISO news releases are available on the ISO website at <http://www.caiso.com/Documents/ISOBoardHonorsBerberichsService-WelcomesNewCEOMainzer.pdf> and <http://www.caiso.com/Documents/California-ISO-Announces-Retirements-Creation-Executive-Position.pdf>

III. O&M Budget - Process View

The ISO uses an activity-based costing system to provide greater transparency and granularity in how the budget supports corporate efforts. In support of this system, all employees record time worked each week to activities that roll-up to the six primary processes described below. Aggregating the time reported by employees results in percentages for each of the processes that represent the percentage of total resources spent on that process. Using the hours from the first nine months of 2020, the resulting percentages are then applied to the 2021 O&M budget. The results represent the costs for the six processes as shown below.



Plan and Manage Business

The **plan and manage business** process amounts to 10% of the O&M budget, and consists primarily of the activities related to strategic planning, governance, financial planning and project management.

Support Business Services

The **support business services** process amounts to 38% of the O&M budget, and is comprised primarily of the activities related to information technology, financial, legal and compliance support services.

Manage Human Capabilities

The **manage human capabilities** process amounts to 4% of the O&M budget, and consists of five primary end-to-end processes that combine to ensure the ISO attracts and retains the skills and talent necessary to achieve business objectives. The processes are compensation, benefits, recruitment, training and development, and employee relations.

Develop Markets and Infrastructure

The **develop markets and infrastructure** process group amounts to 10% of the O&M budget, and includes two separate processes that support the creation of value-added enhancements to the market design, as well as to proactively plan and facilitate grid upgrades. Activities in these processes include the review and analysis of the efficiency and quality of market results, identifying needed market design improvements, and transmission and generation interconnection planning.

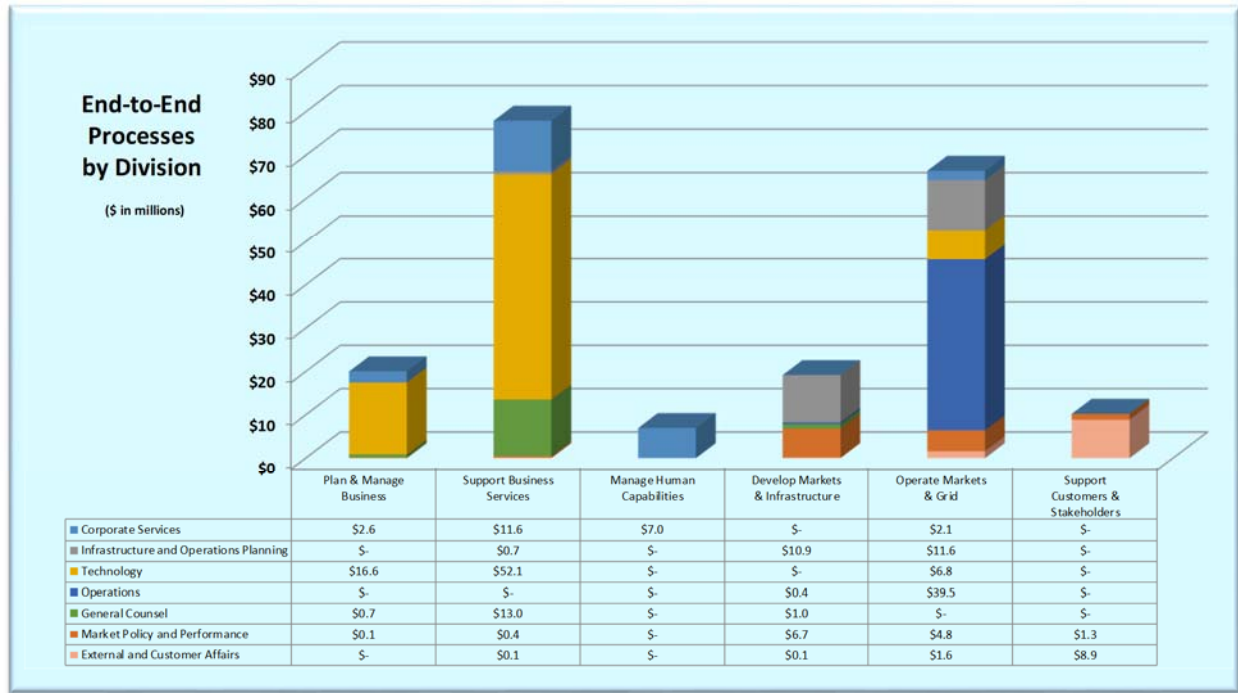
Operate Markets and Grid

The **operate markets and grid** process group amounts to 33% of the O&M budget, and includes three separate processes: 1) manage market and reliability data and modeling; 2) manage markets and grid; and 3) manage operations support and settlements.

Support Customers and Stakeholders

The **support customers and stakeholders** process amounts to 5% of the O&M budget, and consists primarily of the activities related to client and account management, stakeholder processes, government and regional affairs, and communications.

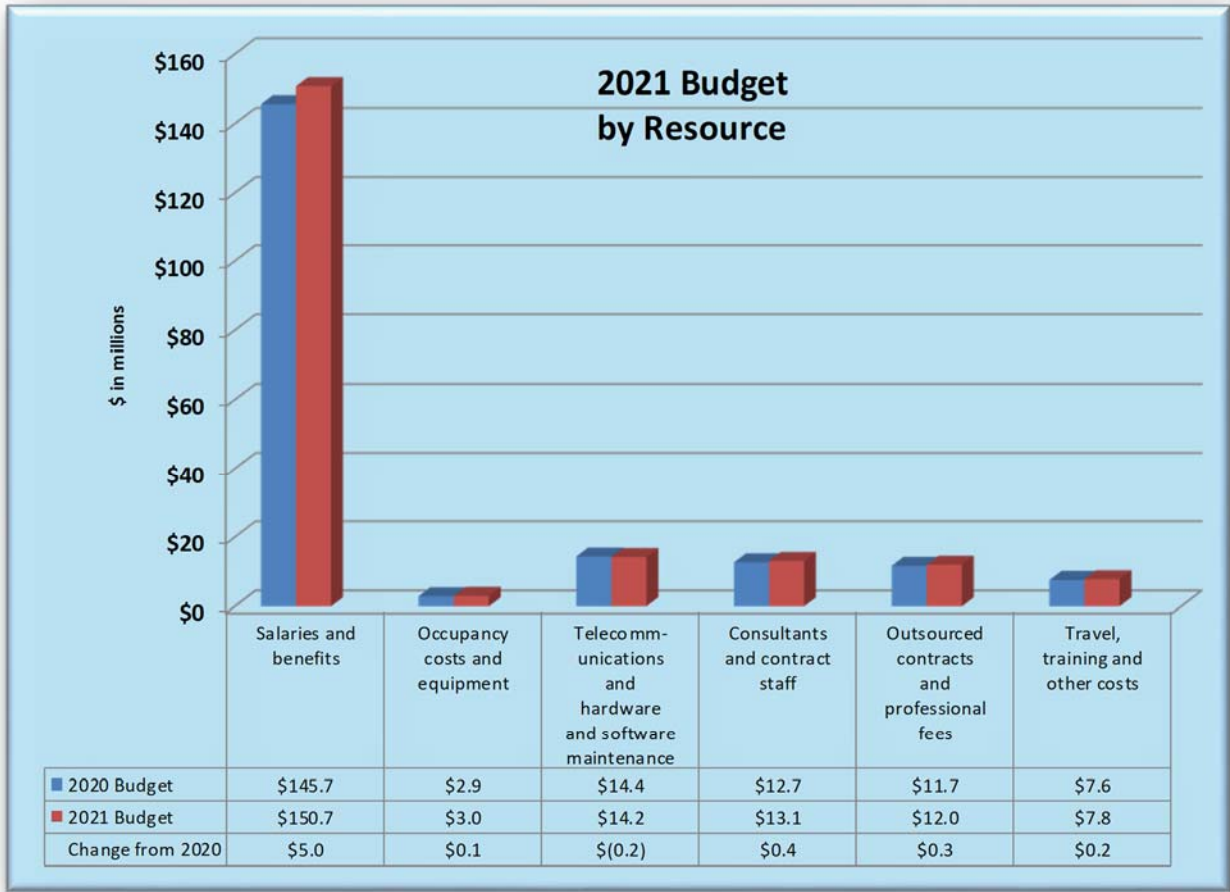
A look at how the process costs are allocated by division is as follows.



IV. O&M Budget - Resource View

This section views the O&M budget in the traditional resource categories in which expenses are classified. The 2020 budget reflects reclassifications in order for it to be comparable to the 2021 budget presentation.

The chart below shows the major resource components.



Salaries and Benefits

The ISO depends on its highly educated and experienced employees to operate the grid and support market functions, which makes staff a critically important resource. To that end, the salaries and benefits category comprises of 75% of the 2021 and 2020 budgets.

The staffing plan concentrates on attracting and retaining the best and brightest individuals in the industry. At times, the ISO revises the organizational structure to help keep pace with changing resource needs. The ISO also makes periodic organizational changes to align resources to focus on the important matters identified in the company’s Strategic Vision, and better reflect end-to-end business processes.

The budgeted staffing level for 2021 is 658 employees, which is an increase of 10 positions over the 2020-budgeted staffing level. The 2021 staffing level increase addresses the needs in the Project Management Office, Power Systems Technology Development and Operations, Market Engineering Support, Information Technology Product Development and Management, Market Quality, and Real Time Operations departments. There is no vacancy factor included in the 2021 budget.

A summary of the budgeted headcount for 2021 and 2020 is as follows.

Projected Staffing Levels	2021 Budget	2020 Budget	Change
Corporate Services Divisions	53	53	-
Infrastructure Planning and Development	102	102	-
Technology	215	208	7
Operations	163	162	1
General Counsel	35	35	-
Market Policy and Performance	49	47	2
External and Customer Affairs	41	41	-
Gross Headcount	658	648	10
Less Program Office Staff Included in Capital	(5)	(5)	-
Net Headcount	653	643	10

Staffing Related to Capital

As in past years, the O&M budget does not include the costs of full-time equivalent (FTE) staff dedicated to capital projects, which are included in the capital budget. The capitalizable expense related to the FTE is equivalent to five full-time staff in the Technology division’s Program Management Office. The cost of other staff engaged in capital projects is budgeted in their respective cost centers; however, the financial statements that are prepared in accordance with generally accepted accounting principles include the capitalization of this labor.

Compensation Structure

The compensation budget includes funding for employee base salaries, payroll taxes, and healthcare benefits; as well as other compensation elements, such as overtime, performance compensation, relocation reimbursement and tuition reimbursement. The budget also includes funds for salary adjustments for merit, equity and market adjustments. These costs have been budgeted for each position.

In setting the annual merit, equity and market adjustments budget, the Human Resources department participates in salary surveys administered by qualified third-party vendors. These vendors confidentially gather information related to competitive market pay rates. The ISO's ability to attract and retain talent with the necessary skills and knowledge directly links to our ability to maintain competitive pay practices.

The total compensation packages provided to employees include performance compensation with payouts in the subsequent year based on individual and corporate performance.

A summary of the compensation components is as follows.

Compensation Components With Benefit Burden (\$ in millions)	2021 Budget	2020 Budget	Change
Base Compensation	\$123.2	\$119.5	\$3.7
Overtime (includes structured overtime for grid operators)	\$7.5	7.0	0.5
Performance Compensation	\$18.0	17.4	0.6
Other	\$2.0	1.8	0.2
Total Personnel Expense	\$150.7	\$145.7	\$5.0

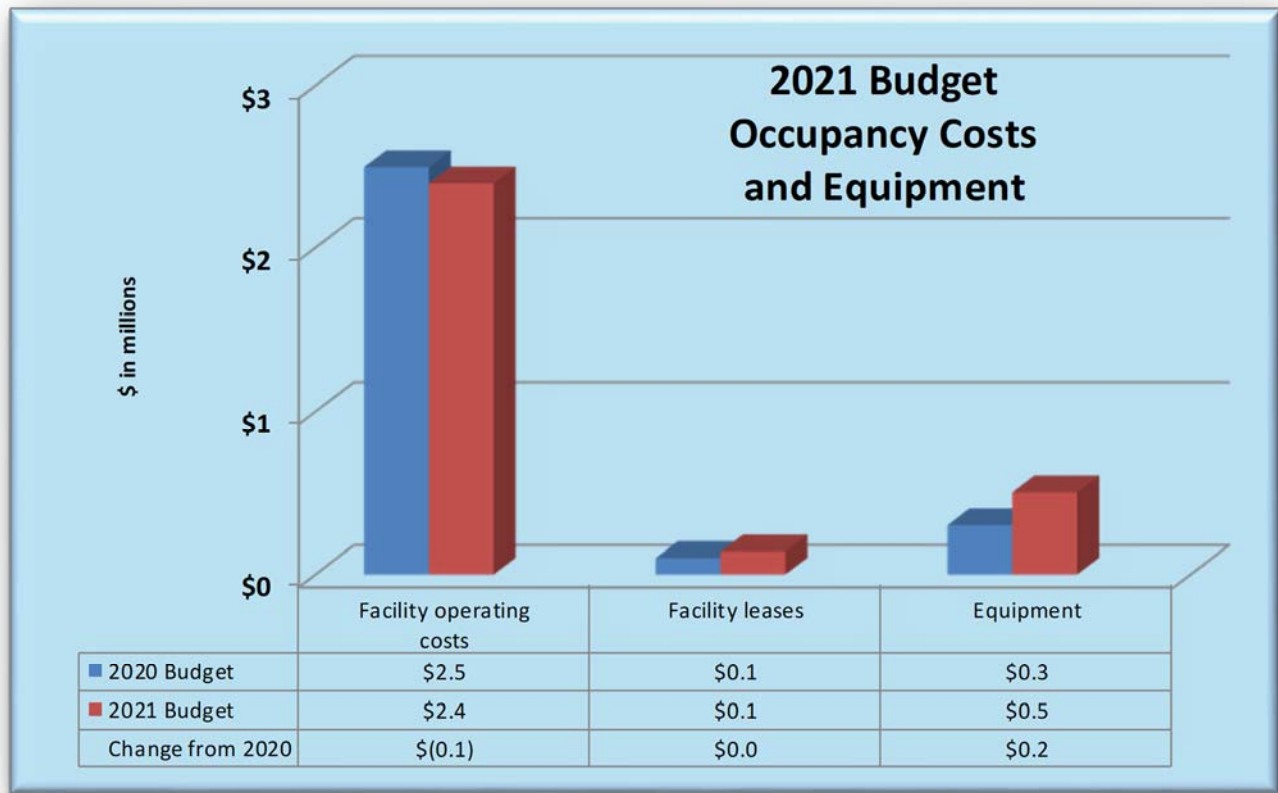
The 2021 employee benefits burden will reduce from 38% to 36% of salary costs as summarized in the table below. There are a few drivers helping the ISO to achieve lower overall benefit costs. These drivers include improved claims history, improved cost controls achieved thru the self-funded insurance program, lowered premiums offered through other benefit providers, and leveraging the self-funded healthcare reserve to help offset some premium costs. The ISO will continue to manage contracts, prudently, to ensure these benefits are available to eligible employees with the costs primarily depending on employee population levels and participation.

The benefits burden is broken down as follows.

Benefit	Components	Rate
Health, Welfare, and Other Plans	Medical, dental and vision insurances. Also includes employee assistance program, life insurance, accidental death insurance, long-term disability insurance, and worker's compensation.	13%
Payroll Taxes	Social security, medicare, unemployment insurance, employment training and disability insurance.	9%
Retirement Benefit Plans	Retirement savings benefit plan (401(k)) and executive retirement plans.	14%
Benefit Burden Rate		36%

Occupancy and Equipment

Occupancy and equipment costs will increase nominally to \$3.0 million for 2021. These costs represent 1% of the 2021 and 2020 budgets.

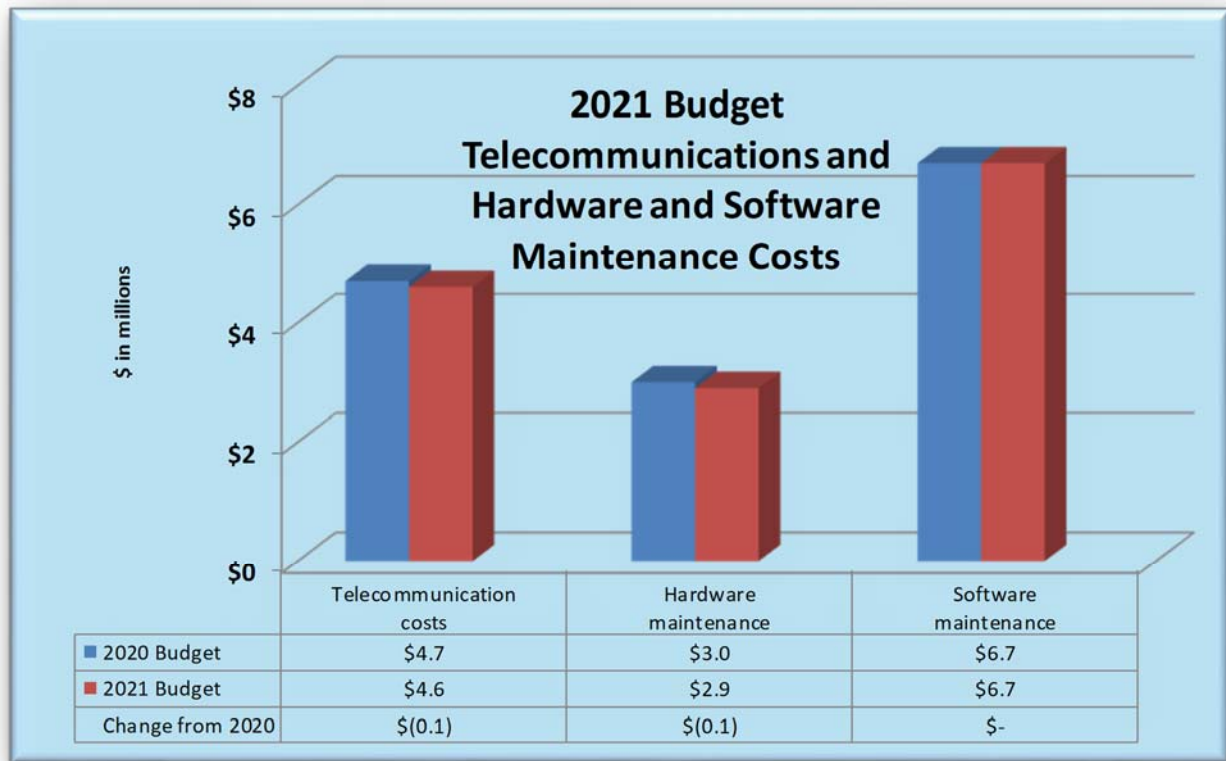


This resource category consists of the various ongoing costs to operate the facilities and related equipment.

The increase of \$0.2 million in equipment is due to cyclical replacement. The nominal decrease in facility operating costs is due to reduced negotiated rates with service vendors.

Telecommunications and Hardware and Software Maintenance

Telecommunications and hardware and software maintenance costs will decrease by \$0.2 million to \$14.2 million for 2021. These costs represent 7% of the 2021 and 2020 budgets.

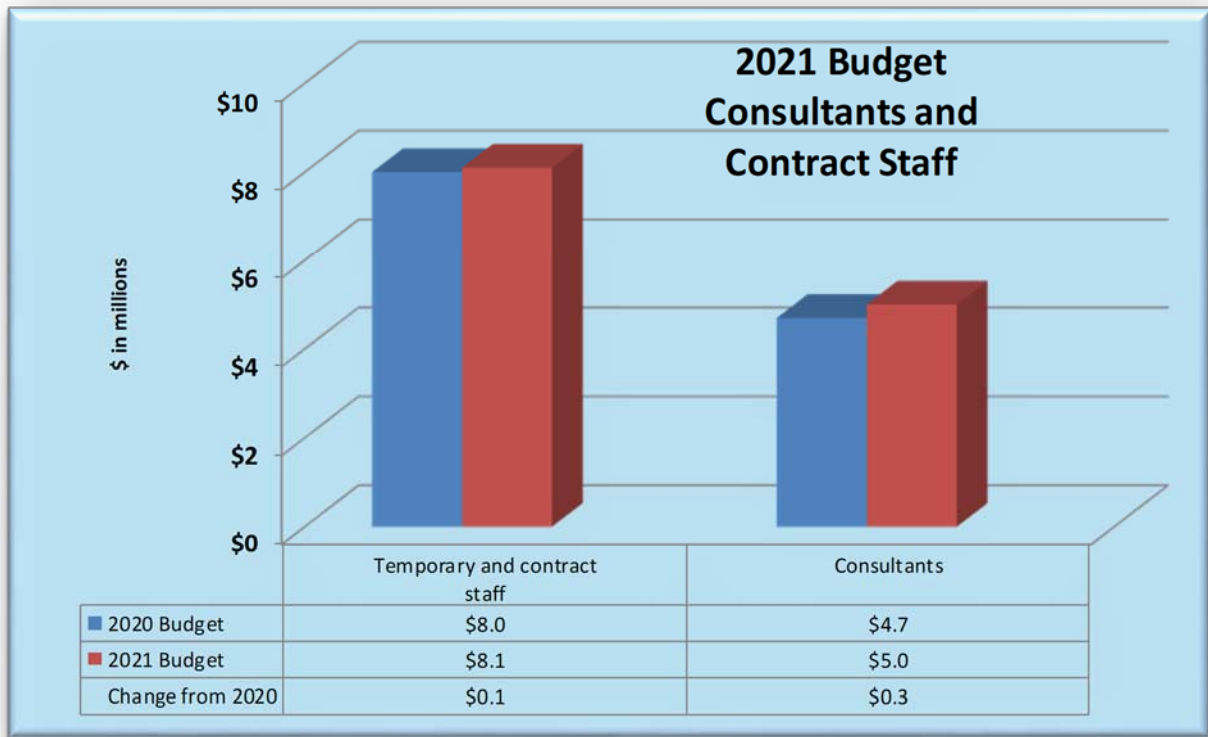


Telecommunication costs, which include wired and wireless services, will decrease nominally for 2021. The decrease is primarily due to reduced negotiated rates for services.

Hardware and software maintenance costs, which are primarily licensing fees, will also decrease nominally for 2021. The decrease is primarily due to reduced negotiated rates for support.

Consultants and Contract Staff

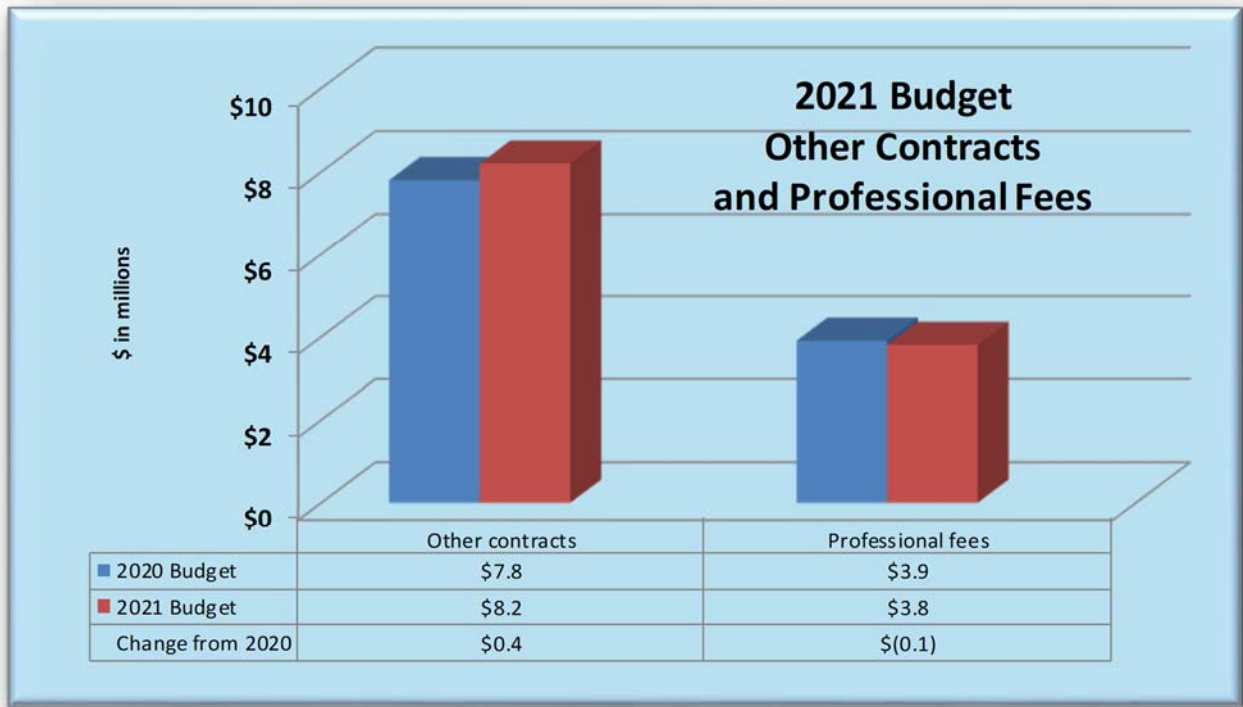
Consulting and contract staff costs will increase by \$0.4 million to \$13.1 million for 2021. The consulting and contract staff budgets represent 7% of the 2021 and 2020 budgets.



The ISO regularly evaluates how to meet its responsibilities while remaining cost-effective and providing the highest service quality whether through hiring full-time employees or using outside resources (e.g., contractors, consultants or temporary staff). At times, the ISO may bring contractor work in-house when it is of an ongoing nature and lowers the overall cost with the same or better service quality. Examples of efforts requiring budget in 2021 include resource adequacy studies, process assessments, records automation efforts, training, day-ahead-market studies, technology and operations applications maintenance, and the need for subject matter experts in various fields such as renewable integration.

Other Contracts and Professional Fees

Outsourced contracts and professional fees will increase by \$0.3 million to \$12.0 million for 2021. The budget category represents 6% of the 2021 and 2020 budgets.



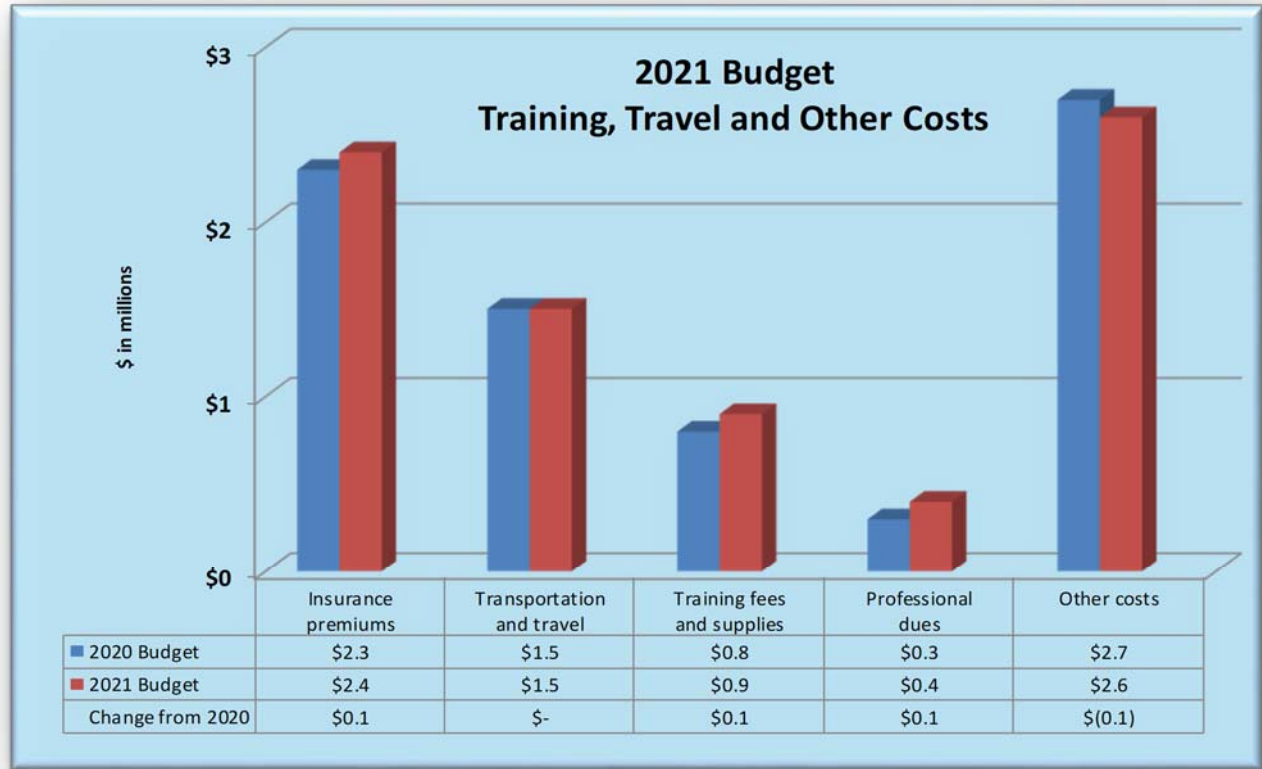
Other contracts, which represent contracts with third-party vendors for services, will increase by \$0.4 million in 2021. The primary driver being the addition of tools needed to support RC functions.

A large component of the other contracts resource category is our forecasting costs. Intermittent resources pay a forecasting fee to the ISO of \$0.10 per megawatt hour of generation. Such fees are budgeted for a total of \$4.5 million in 2021. These fees received from the variable resources are included in the other costs and revenues component of the GMC revenue requirement to offset the related forecasting costs.

Professional fees, which are largely outside legal and audit costs, will decrease nominally for 2021.

Training, Travel and Other Expenses

Training, travel and other costs will increase \$0.2 million to \$7.8 million for 2021. These budgets represent 4% of the 2021 and 2020 budgets.



Insurance premiums, which include all of the corporate liability and property policies, will have a nominal increase for 2021.

Transportation and travel remains unchanged for 2021.

Training fees and supplies will have a nominal increase for 2021. The increase is primarily due to corporate training needs.

Professional dues and other costs (primarily bank fees, conference fees, office supplies and Board and stakeholder meeting costs) when combined remain unchanged for 2021.

Reconciliation of 2021 O&M Budget

The O&M budget will increase by \$5.8 million, or 3%, to \$200.8 million in 2021 compared to \$195.0 million in 2020.

A reconciliation of the change follows (\$ in millions).

2020 O&M Budget	\$195.0
Increases in the Budget	
Merit and other compensation increases	4.5
Increase in overtime	0.5
Increase in other contracts and services	0.4
Increase in consultants	0.3
Increase in equipment	0.2
Increase in insurance	0.1
Total Increases	6.0
Decreases in the Budget	
Reduction in telephone & network maintenance	(0.2)
Total Decreases	(0.2)
Net Change in Budget	5.8
2021 O&M Budget	\$200.8

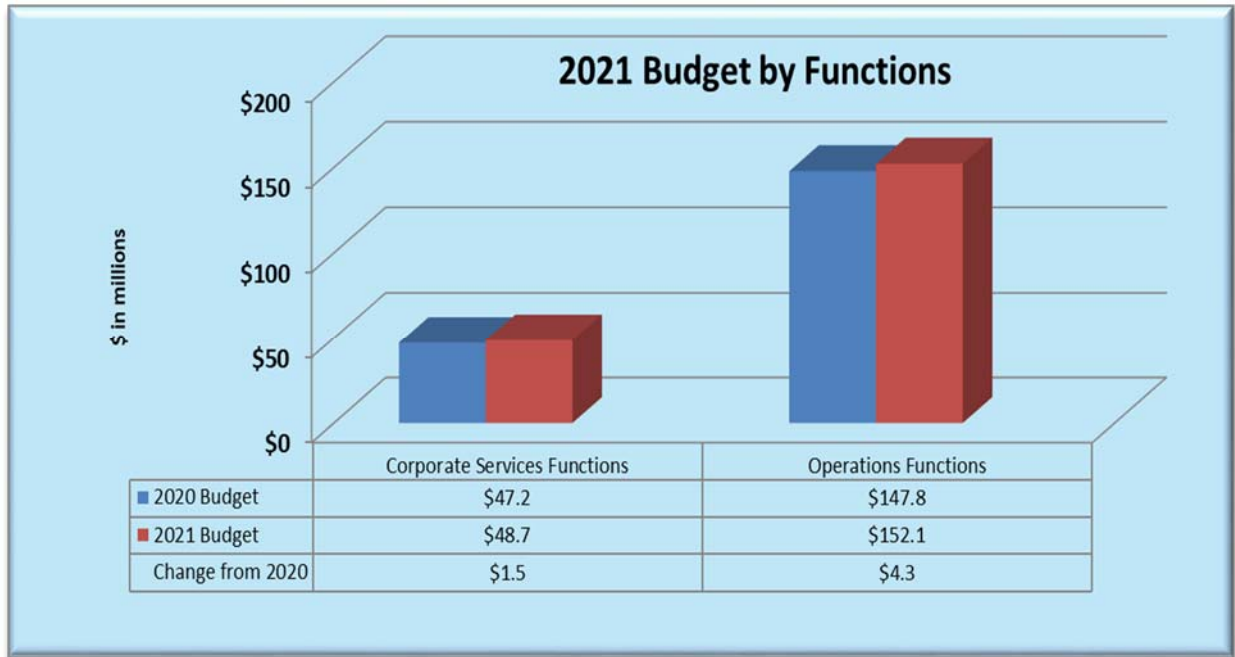
V. O&M Budget - Divisional View

In October 2020, the ISO announced the retirement of Petar Ristanovic, Vice President of Technology, and Eric Schmitt, Vice President of Operations; as well as, the promotion of Mark Rothleder to the newly created Chief Operating Officer position. The ISO structure will undergo organizational changes over the coming months as a result of the announcements. The 2021 O&M budget will be modified from what is presented in the budget book to reflect the organization changes. However, the overall 2021 corporate O&M budget amount will remain within the Board of Governor's approved amount. For illustration purposes, the 2020 and 2021 division budgets are presented as part of the high-level functions the divisions perform in the organization.

The **Corporate Services** functions include those functions performed by the office of the Chief Executive Officer, the Finance division, the Human Resources division, the General Counsel division, the External and Customer Affairs division; as well as, the Department of Market Monitoring.

The **Operations** functions include those functions managed by the Chief Operating Officer and include the Infrastructure and Operations Planning division, the Operations division, and the Market Policy and Performance division. The functions also include the technology related groups including the Power Systems and Market Technology division, the Infrastructure Engineering and Network Operations department, and the Program and Applications Management department.

The budget by functions is as follows.

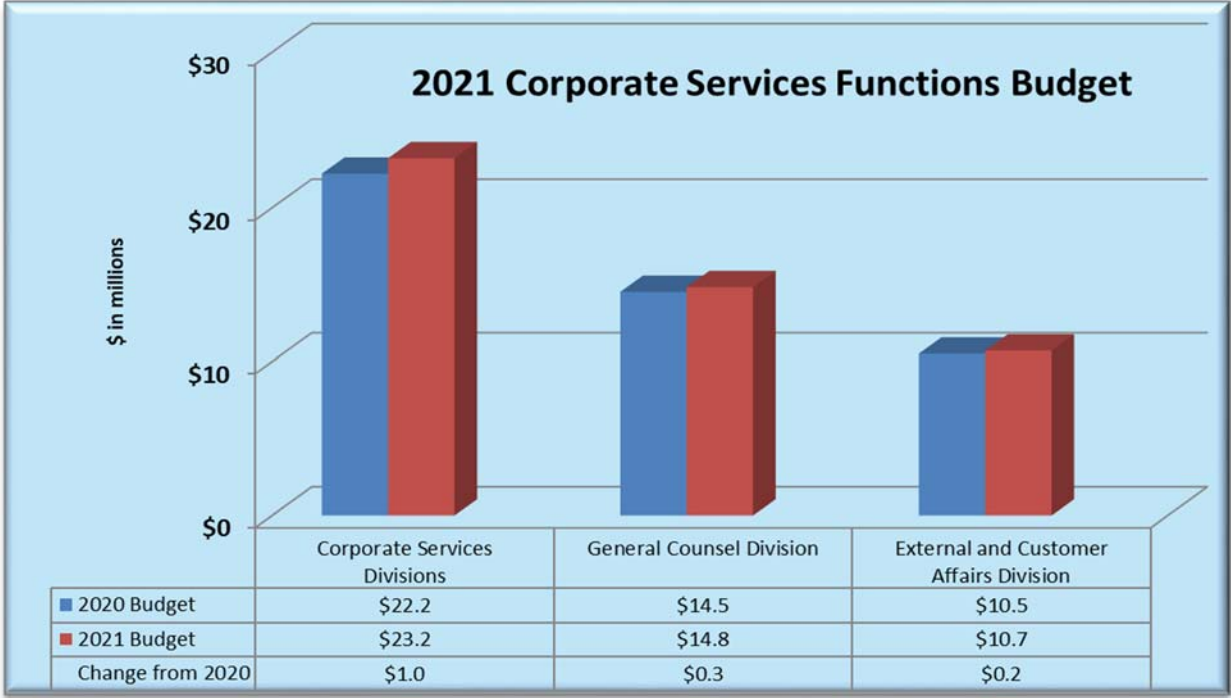


The divisions contributing to the Operations functions account for a combined 76% of the O&M budget. Whereas the divisions contributing to the Corporate Services functions account for a combined 24% of the O&M budget. In all divisions, with the exception of the Technology related groups, the typical driver of year-over-year changes are labor related costs. While labor costs are also a main driver in the technology related groups, many of the other resource categories can have an impact on their budget as well (e.g., hardware and software maintenance costs).

A detailed description of the divisions grouped by the functions follows including budgeted staffing levels and a description of any material budget changes.

Corporate Services Functions

The Corporate Services functions include those functions performed by the Corporate Services divisions, including the Chief Executive Officer, the Finance division, the Human Resources division; as well as, the Department of Market Monitoring. It also includes the functions performed by the General Counsel division and the External and Customer Affairs



Corporate Services Divisions

The **Finance** division is comprised of various financial functions including treasury, credit, accounting, financial planning and procurement. Finance professionals manage cash and investments, insurance, credit and collateral management, clearing of the ISO market, general accounting, internal and external financial reporting, payables processing, financial planning and forecasting, budgeting, and administering the grid management charges (GMC) and other fees. Through effective vendor selection and negotiation expertise, staff procures and manages goods and services for the corporation, as well as negotiates and manages commercial contracts.

The **Human Resources** division establishes policies, programs and “people strategies” to attract and retain the uniquely talented professionals needed to reliably operate the electric grid and meet corporate strategic objectives and goals.

Essential people strategies include:

- Creating and reinforcing an intentional culture
- Sustaining a highly engaged workforce
- Enhancing knowledge and skills to ensure relevancy
- Continuing to develop technical experts and strong leadership capabilities
- Recruiting and developing talent pipelines to retain targeted skills for critical areas

The **Department of Market Monitoring (DMM)** proactively undertakes sophisticated analysis to enhance market efficiencies and mitigate market power. This effort is especially important as the ISO implements new market features and services to support renewable resource development.

The department actively monitors the wholesale energy markets to prevent non-competitive behavior and ensure participants follow the rules. The DMM also reviews market results to confirm the activity produces effective and efficient outcomes.

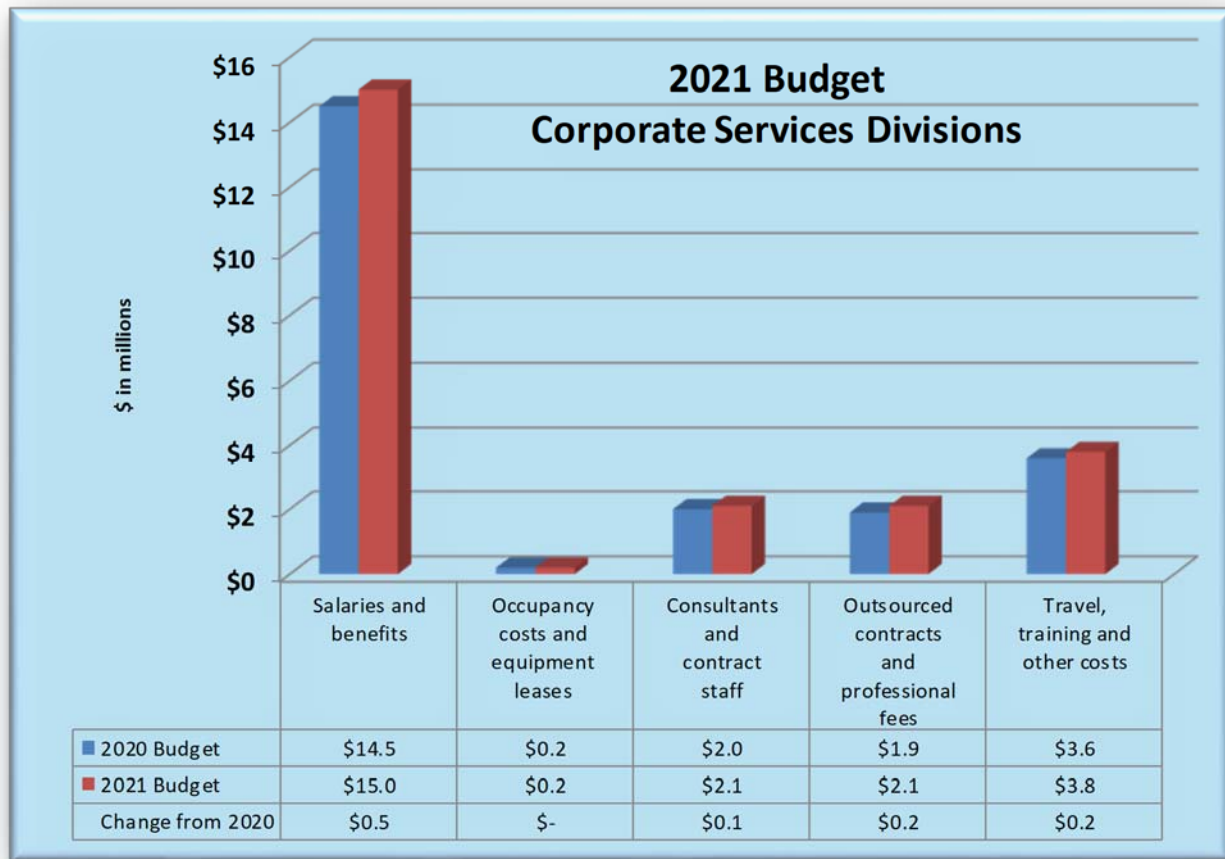
The department continues to review and provide feedback on the effectiveness of the 15-minute/5-minute markets and the Western Energy Imbalance Market (EIM).

The DMM offers timely input on major market design initiatives, as well as products and requirements to ensure sufficient flexible capacity is available to integrate increasing amounts of variable renewable energy. In addition, the DMM works closely with the Market Quality and California Regulatory Affairs division to identify the challenges and opportunities of excess generation as more renewable resources, especially solar, are interconnected to the grid.

The DMM Oversight Committee and the Board of Governors separately review and approve the DMM budget. The budget is included in the Chief Executive Officer division.

Summary of Budget

The Corporate Services divisions' budgets will increase by \$1.0 million to \$23.2 million for 2021. Staffing remains unchanged at 53.



Salaries and benefits will increase by \$0.5 million due to budgeted merit increases and corporate benefit items held in these divisions.

Consultants and contract staff will increase nominally due to additional corporate recruitment efforts.

Outsourced Contracts and professional fees will increase by \$0.2 million primarily due to fees associated with benefit administration.

Travel, training and other costs will increase \$0.2 million due to corporate training and insurance premiums.

General Counsel Division

The General Counsel division is led by the Vice President, General Counsel, Chief Compliance Officer, and Corporate Secretary. The division is composed of the legal department, compliance and corporate affairs, internal audit, and the corporate secretary functions.

The **Legal** department provides legal and regulatory counsel to the Board of Governors, the CEO, the executive team, and the ISO business units. The legal team provides advice and support on all legal matters that could affect the company. Legal advice is provided in all areas of the business, including regulatory proceedings before state and federal agencies, all tariff-related matters including tariff amendments, generator interconnection issues, regulatory contracts, litigation, appeals and other adversary proceedings, compliance matters, vendor contracts, intellectual property, finance, tax, corporate governance, ethics and code of conduct matters, human resources, and immigration. The legal team is also responsible for federal regulatory outreach.

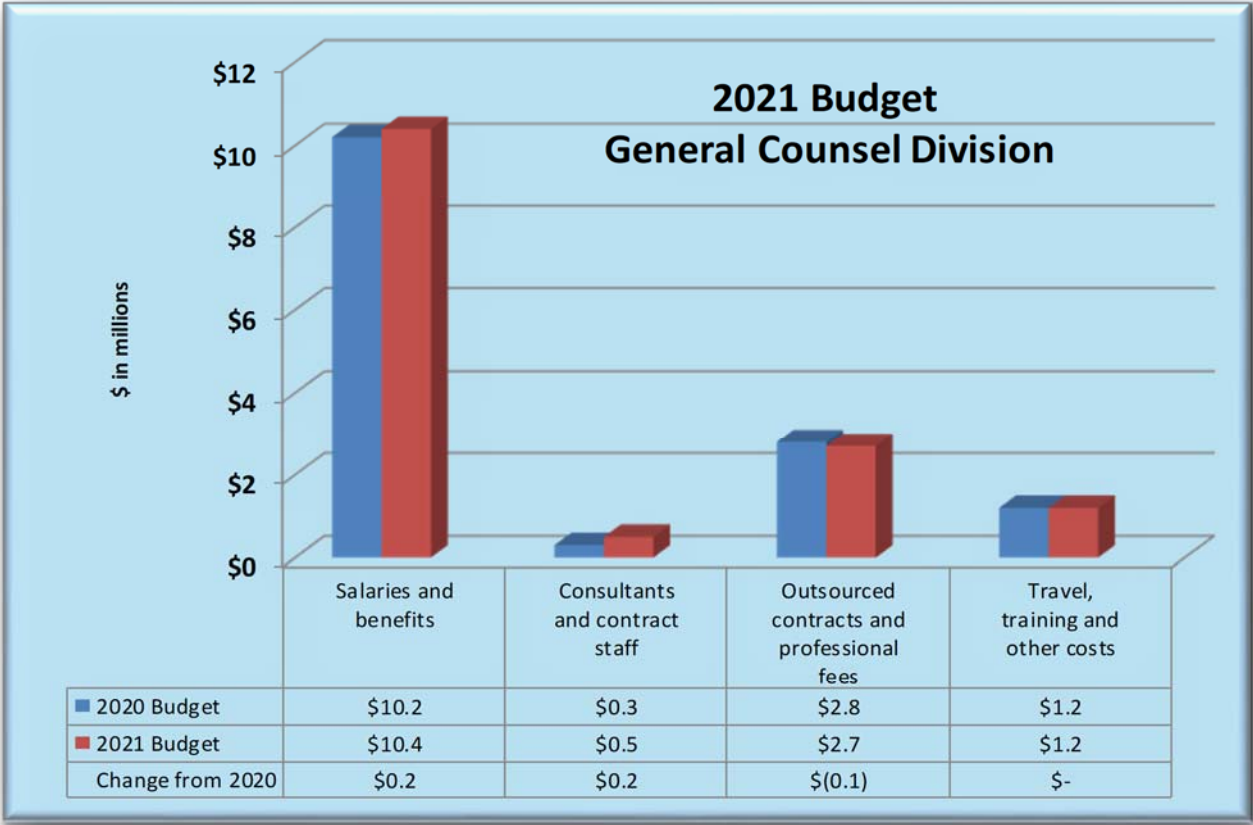
Compliance and Corporate Affairs promotes a corporate culture of compliance in support of all laws, regulations and corporate policies. The department assesses and ensures business units implement new and revised reliability standards and tariff requirements by documenting and monitoring processes, procedures and tools used to validate compliance. It collaborates with business units to test the effectiveness of internal controls to minimize the risk of non-compliance. It is also responsible for developing and implementing the corporate records management program in accordance with legal and regulatory recordkeeping requirements. In addition, Compliance and Corporate Affairs is responsible for a number of enterprise-wide responsibilities, including Strategic Vision development and formation of corporate annual and long-term goals and metrics.

Audit and Advisory Services develops the annual internal audit plan and conducts audits to evaluate the effectiveness of management practices and controls. The team provides executive management and the Audit Committee with reasonable assurance regarding whether processes and controls are functioning as intended and risks are well managed. Internal Audit also facilitates the ISO enterprise risk activities, including briefing executive management and the Board of Governors on the top risks and status of the associated mitigation efforts. Internal Audit serves as an advisor to business units to add value and help promote a culture of compliance and ethics.

The **Corporate Secretary** oversees a team that coordinates Board and other governance-related matters that include Board of Governors and EIM Governing Body meetings and materials, Board committee meetings and materials (including for the Market Surveillance Committee), and other Board and EIM Governing Body communications. This group also maintains the official corporate record with regard to Board and EIM Governing Body matters.

Summary of Budget

The General Counsel division budget will increase nominally to \$14.8 million for 2021. Staffing remains at 35.



Salaries and benefits will increase by \$0.2 million due to budgeted merit increases.

Consultants and contract staff will increase by \$0.2 million primarily due to records automation efforts.

Outsourced contracts and professional fees will decrease nominally due to reduced need for regulatory outside counsel.

External and Customer Affairs Division

The **External and Customer Affairs** division's core mission is to provide professional and high quality service and support to the ISO's customers and stakeholders. The division engages with a broad group of stakeholders, customers, market participants, regulators, elected officials, and consumer and environmental groups to improve the ISO interactions and develop deeper collaboration with these entities.

Some of these activities include:

- Day-to-day response to issues and customer inquiries,
- Developing and providing general and client-specific training,
- Managing public stakeholder processes,
- Coordinating internal and external communications including the news media, social media and website management,
- Engaging state and federal legislators and their staff,
- Expanding participation in ISO market,
- Providing a broad assortment of external briefings and supporting materials.

There are three main functions within the division: Customer Service and Stakeholder Affairs, Communications and Public Relations, and External Affairs.

The **Customer Service and Stakeholder Affairs** department is the primary business contact between the ISO, its customers, and industry stakeholders. It offers bid-to-bill support services to all customers and provides technical support and training to new participants. The team relies on web-based resources, links to trade associations, and staff support to resolve customer issues and keep customers apprised of changes and policy initiatives, making it easier and seamless for entities to navigate and realize the full benefits of participating in the ISO markets. Responsibilities also include customer readiness (training) and management of all public stakeholder initiatives.

The **Communications and Public Relations** department manages internal and external communications, which includes producing printed, digital, social media, and video materials. The department is responsible for website management, employee communications, and media relations. The department issues stakeholder communications, and develops new information, products, and services that add value to stakeholders, and others participating in the ISO grid and energy markets.

The **External Affairs** group includes several business units including State Affairs, Regional and Federal Affairs, and Strategic Alliances and Regional Integration.

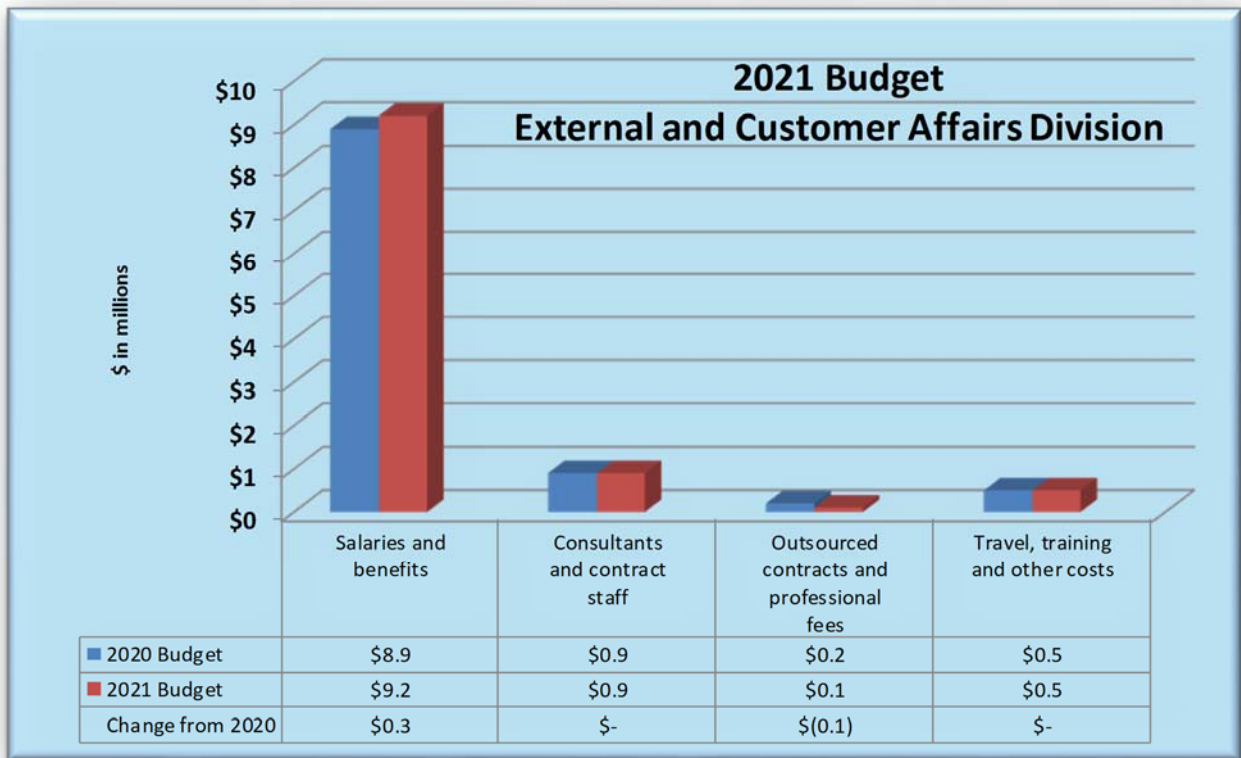
The **State Affairs** team develops relationships and maintains interactions with State of California lawmakers, the Administration, business associations, environmental organizations, and international delegations to enhance their understanding of grid operation and matters that could affect the reliability or economics of the ISO grid and energy markets. Additionally, the department tracks and comments on state legislation, and manages ISO Board of Governor's state Senate confirmations.

The **Regional and Federal Affairs** team monitors activities and manages relationships with state and federal governments, and regional and national industry stakeholders and associations. To ensure participants from across the West have a voice on regional related matters, such as the Western Energy Imbalance Market (EIM), this team supports the EIM governance structure and facilitates coordination between the EIM Governing Body, Regional Issues Forum, Body of State Regulators, and stakeholders.

The **Regional Integration** and **Strategic Alliances** teams promote regional coordination and cooperation across the West, which includes expanding the Western EIM and other market services. These groups collaborate closely with other internal divisions and senior management to provide clear and professional coordination with regional utilities by supporting cost/benefits analysis, regulatory filings, and other activities necessary for participation in the ISO's markets. In addition, these groups provide expertise, education, and outreach to entities including neighboring balancing authorities, third party transmission customers, and a variety of other stakeholders on matters of importance to them.

Summary of Budget

The External and Customer Affairs division budget will increase by \$0.2 million to \$10.7 million for 2021. Staffing remains at 41.

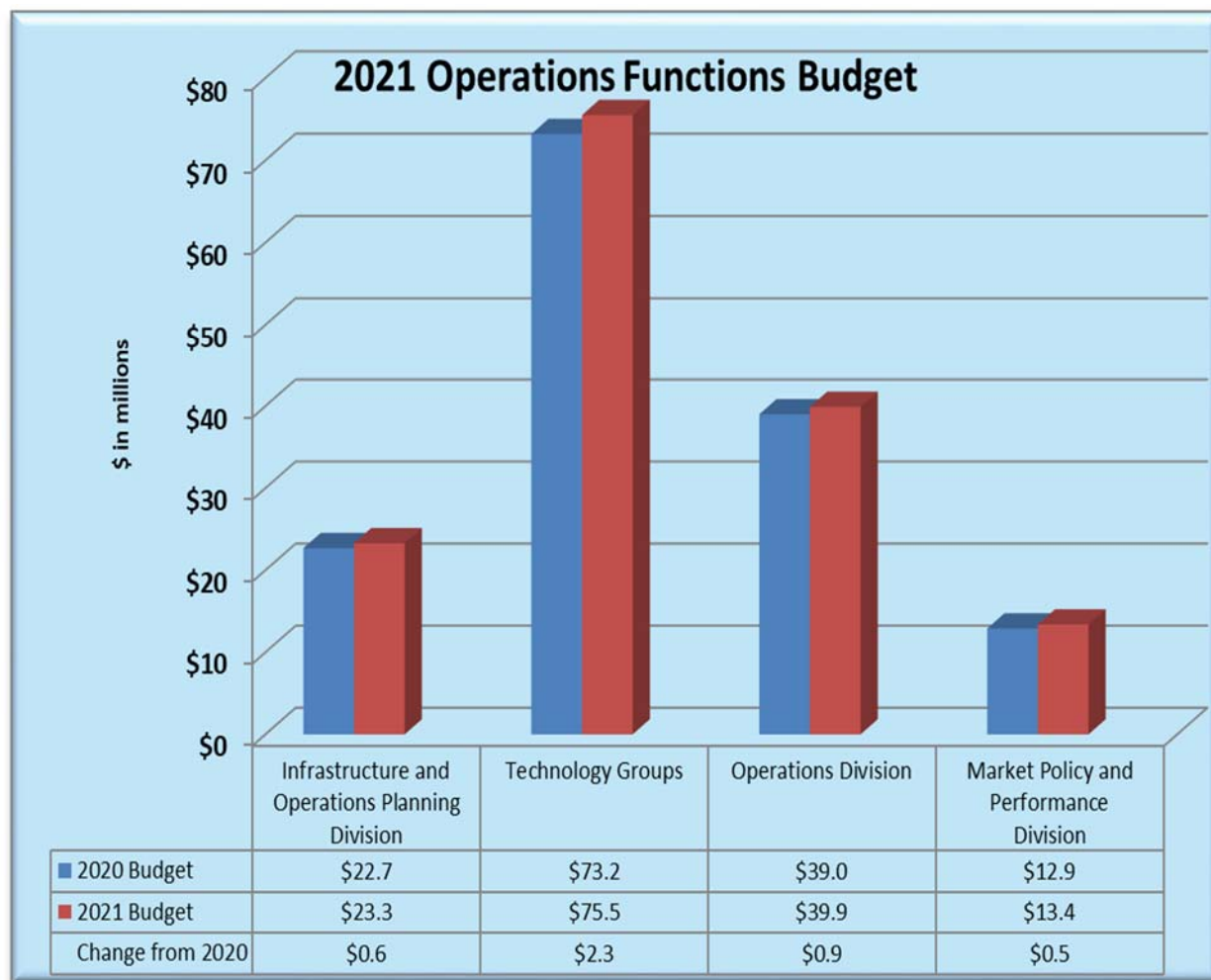


Salaries and benefits will increase by \$0.3 million due to budgeted merit increases.

Outsourced contracts and professional fees will decrease nominally due to a contractor conversion in 2020.

Operations Functions

The **Operations** functions include those functions managed by the Chief Operating Officer and include the Infrastructure and Operations Planning division, the Technology groups, the Operations division, and the Market Policy and Performance division. The technology groups include the Power Systems and Market Technology division, the Infrastructure Engineering and Network Operations department, and the Program and Applications Management department.



Infrastructure and Operations Planning Division

The Infrastructure and Operations Planning division creates a holistic 10-year forward-looking transmission plan each year that supports the growth in renewable resources, and maintains and strengthens grid reliability. The division leads the generation interconnection application and contracting process, and performs studies for resources seeking to interconnect to the grid. The division promotes timely and efficient infrastructure

development and conducts the annual assessment of summer conditions. It is responsible for complying with NERC standards and WECC regional criteria applicable to the planning coordinator functional entity.

The **Transmission Infrastructure Planning** group conducts transmission planning, local capacity requirement and resource interconnection studies to ensure the ISO transmission system evolves to meet the changing needs of the grid. The group is responsible for the development of the ISO's annual transmission plan that provides a comprehensive evaluation of the ISO transmission grid to address grid reliability requirements, identify upgrades needed to successfully meet California's policy goals, and explore projects that can bring economic benefits to consumers.

The **Grid Assets** group consists of three primary teams, each of which perform a variety of functions. The transmission, substation, and protection engineers, oversee the ISO transmission facilities maintenance standards, and manage a committee for reviewing transmission maintenance practices among the ISO participating transmission owners. This team also oversees the transmission planning competitive solicitation process, and the administration of the transmission register.

The second team is comprised of resources engineers and analysts who oversee the development and publication of the ISO's annual summer assessment that provides stakeholders an overview of the expected ISO connected loads, and the available generation resources to meet that load. This team also responds to WECC, NERC, FERC, CEC, and other regulatory compliance data requests.

The third team consists of generation interconnection specialists, who manage the generation interconnection process and assist generation interconnection developers through the application and interconnection study process.

The **Infrastructure Contracts and Management** group develops and manages contracts to support the efficient function of the ISO markets. This includes generator interconnections, regulatory must-run, black start and other various contracts related to reliable grid operations as determined by state and federal policies, and technological advances. Ongoing duties include developing policy positions on regulatory issues and responsibility for more than 3,500 ISO regulatory contracts, including their negotiation, drafting, and administration. In addition, the group is responsible for contract management of projects in the ISO's generator interconnection queue monitoring and assisting

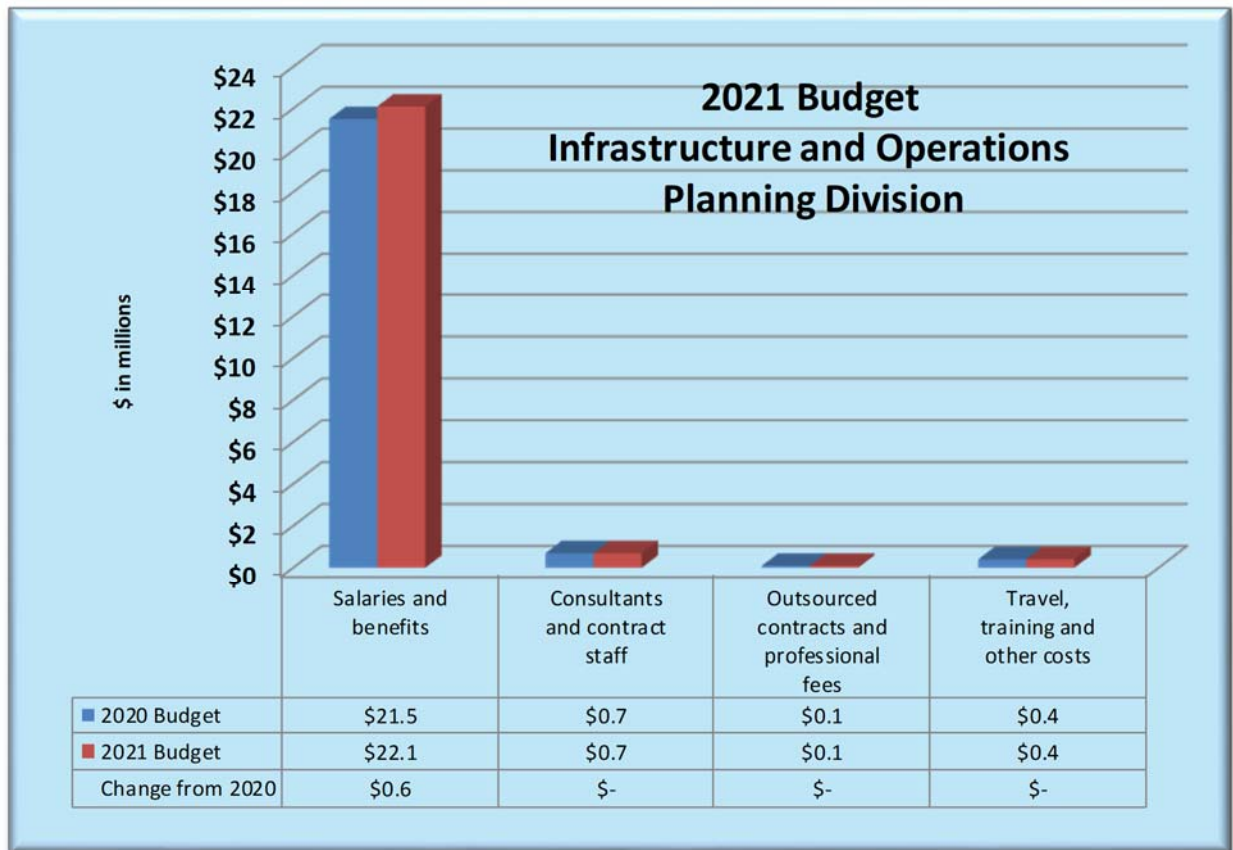
developers to reach their commercial operation of new generation on a timely basis. The group also coordinates repowering and retirement of generation for the company.

The **Operations Engineering Services** department directly supports the Reliability Coordination and Real Time Operations departments with engineering and technical planning services. This includes performing annual and monthly resource adequacy validation and replacement requirement analysis; seasonal assessments, outage management and coordination analysis; and day-ahead and real-time engineering analysis. The department also assists in developing operating procedures and tools. Operating engineers use advanced technology tools to proactively manage the dynamic minute-by-minute changes experienced on the grid system.

The **Regional Operations Initiatives** department works with state, regional, and national entities to balance policy requirements with operational capabilities. This department is also the ISO liaison for coordinating gas and electric policies with state agencies and stakeholders, and represents the West in national forums on related gas and electric market issues. Additionally, this team provides comprehensive root-cause analysis services for both critical processes and operational events.

Summary of Budget

The Infrastructure and Operations Planning division budget will increase by \$0.6 million to \$23.3 million for 2021. Staffing remains unchanged at 102.



Salaries and benefits will increase by \$0.6 million due to budgeted merit increases and additional overtime.

All other categories remain unchanged for 2021.

Technology Groups

The technology groups include the Power Systems and Market Technology division, the Infrastructure Engineering and Network Operations department, and the Program and Applications Management department.

The group's priorities are:

- Implementing strategic initiatives by making appropriate process, procedure and system changes,
- Making incremental technology improvements, especially for market and reliability operations,
- Proactively identifying and resolving system problems, and
- Predicting and proactively strengthen system vulnerabilities.

The **Power Systems and Market Technology** division identifies emerging technologies that could benefit ISO operations, as it finds better ways to use mature technologies to enhance grid efficiencies and monitoring capabilities. Technology is critical for efficiently interconnecting and managing renewable resources and identifying issues that could threaten grid reliability. The division reviews and approves technical requirements, software designs, and testing of the scheduling infrastructure business rules, integrated forward market, real-time markets, and market-quality service applications. It also supports ISO operations by developing critical cyber assets and real-time systems. Key functions include product management, software design, and production support for real-time and operations applications. The division works side-by-side with the Operations division to ensure all network releases, patching, and upgrade enhancements transition to production without disrupting grid operations.

The Security, Architecture and Model Management and Quality department, also included in the Power Systems and Market Technology division, supports creation of the tools to maintain the enterprise network model. The team tracks and suggests controls to safeguard corporate information security. The department oversees critical infrastructure protection compliance, executes security, performance and test automation, and ensures overall software quality. The department also defines the information technology architecture guidelines.

The **Infrastructure Engineering and Network Operations** group includes systems engineering, design, automation, and administration; and network and data center operations

which includes 24/7 support of reliability, pre-market, market, post-market, and corporate technology infrastructure; server and database engineering, backup and recovery, storage administration, and change, problem, and asset management. The team also manages redundant data networks and voice communications across multiple sites; as well as, assists in the management of the hardware and software capital budgets.

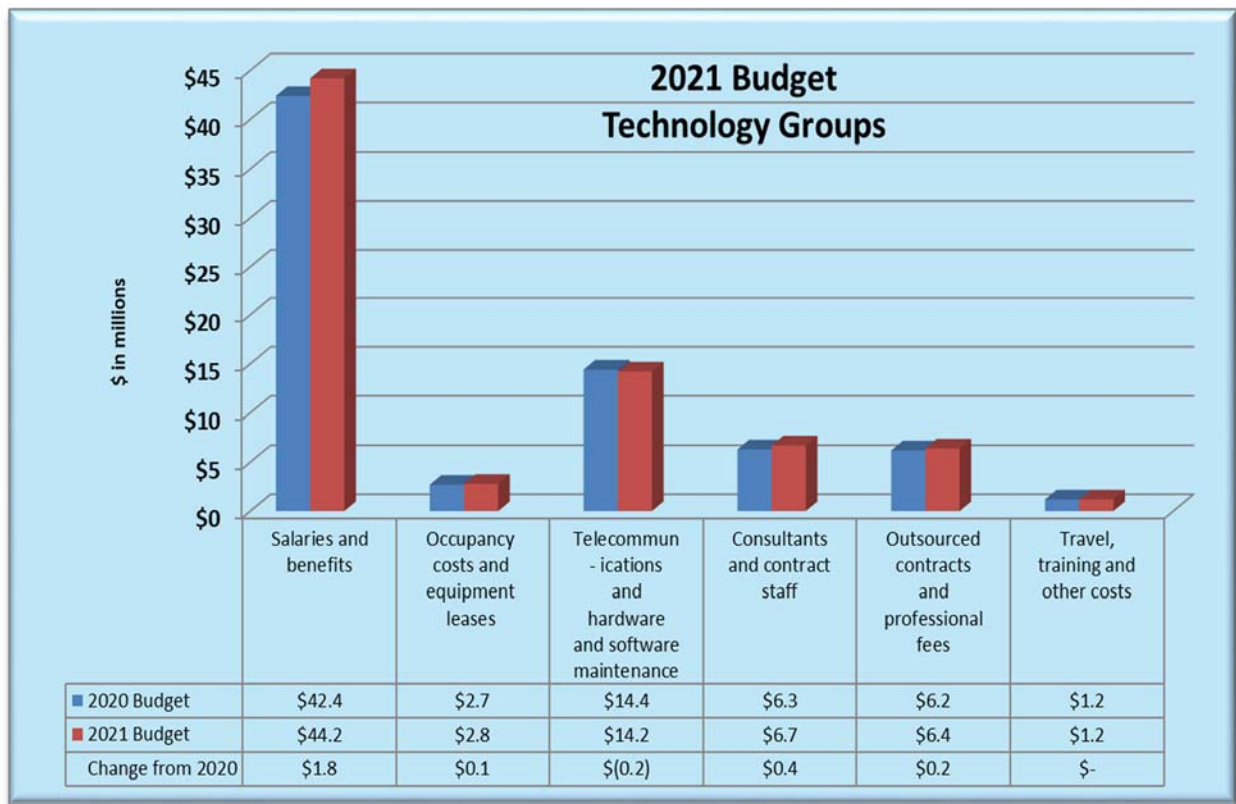
The IT Enterprise Support and Campus Operations department, also included in the Infrastructure Engineering and Network Operations group, manages the service desk, desk side support of client systems, email, and supports all windows servers. The Campus Operations team oversees the company buildings and infrastructure to provide a safe, efficient, and comfortable work environment. Expert building managers keep costs down using industry best practices to maintain the ISO's 277,000 square foot LEED Platinum certified Folsom headquarters that sits on 27 acres, and the 35,833 sq. ft. backup facility in Lincoln. The team is also responsible for physical security at both ISO campuses. Additionally, the team includes incident command and business continuity to ensure the ISO is ready to respond to grid events and support normal business operations.

The **Program and Application Management** group systematically serves the corporate strategy through project and process excellence. It leads, manages, and analyzes major initiatives and projects that enhance customer service and processes. The division's primary functions include release planning, program management, and business and system analysis for the Strategic Vision and the market initiatives roadmap. The Program Management Office follows proven, reliable processes to provide quality services that are based on Project Management Institute and Capability Maturity Model Integration standards.

The Business Solutions department, also included in the Program and Application Management group, identifies software solutions and prepares them for deployment. Key functions include product management, systems analysis, software development, functional and regression testing, customer relationship management, vendor management, production support for ISO operations and corporate and enterprise applications. The department's experts develop software applications that support every ISO division, all enterprise applications, and most applications that interact with external customers.

Summary of Budget

The technology group budget will increase by \$2.3 million to \$75.5 million for 2021. Staffing will increase by 7 to 215.



Salaries and benefits will increase by \$1.8 million due to budgeted merit increases and additional headcount.

Occupancy costs and equipment leases will decrease nominally. Primarily due to reductions in negotiated rates with service vendors.

The combined resources of telecommunication costs and hardware/software maintenance expenses will decrease by \$0.2 million. This is primarily due to continued negotiations of reduced rates for telecommunication services.

Consultants and contract staff will increase by \$0.4 million due to temporary contractors needed to complete efforts such as technology applications maintenance.

Outsourced contracts and professional fees will increase by \$0.2 million primarily due to additional tools needed to support RC functions.

Travel, training, and other costs will remain unchanged for 2021.

Operations Division

The Operations division operates the bulk electric system and wholesale electricity markets with a high degree of reliability. It is comprised of Reliability Coordination, Real Time Operations, Operations Compliance and Controls, and Market Services departments.

The two ISO control centers use geospatial technology and advanced visualization capabilities to provide system operators with a granular view of grid conditions. This means control room staff can quickly identify potential grid and generation problems with a goal of solving them before they affect the real-time delivery of power. The Real Time Operations department operates the integrated forward (wholesale) market and the real-time market to deliver the most cost-effective electricity to consumers in California and seven other Western states while maintaining grid reliability.

The Operations division uses many advanced technologies and tools to reliably operate the grid, and support efficient markets that contribute to the evolution of a modern, flexible grid that reflects state policy and stakeholder goals.

The **Reliability Coordination** department is comprised of reliability coordination operators (RC) and operations engineers (RCMOE) who oversee grid compliance with federal and regional grid standards and can determine measures to prevent or mitigate system emergencies in day-ahead or real-time operations in its area, as well as coordinate with adjacent reliability coordinators. The RC also provides leadership in system restorations following major events.

The **Real-Time Operations** group includes transmission operators, generation dispatchers, market system operators, and their associated managers. This team is responsible for maintaining the reliability of the ISO's bulk electric system by ensuring a proper balance of resources to demand, maintaining adequate contingency reserves, and keeping power flows on the transmission system within acceptable limits.

The **Operational Readiness** group implements the operational aspects of ISO policy and goals, and provides system operators with the tools and training needed to reliably manage the bulk electric system. The department functions include operating a training simulator

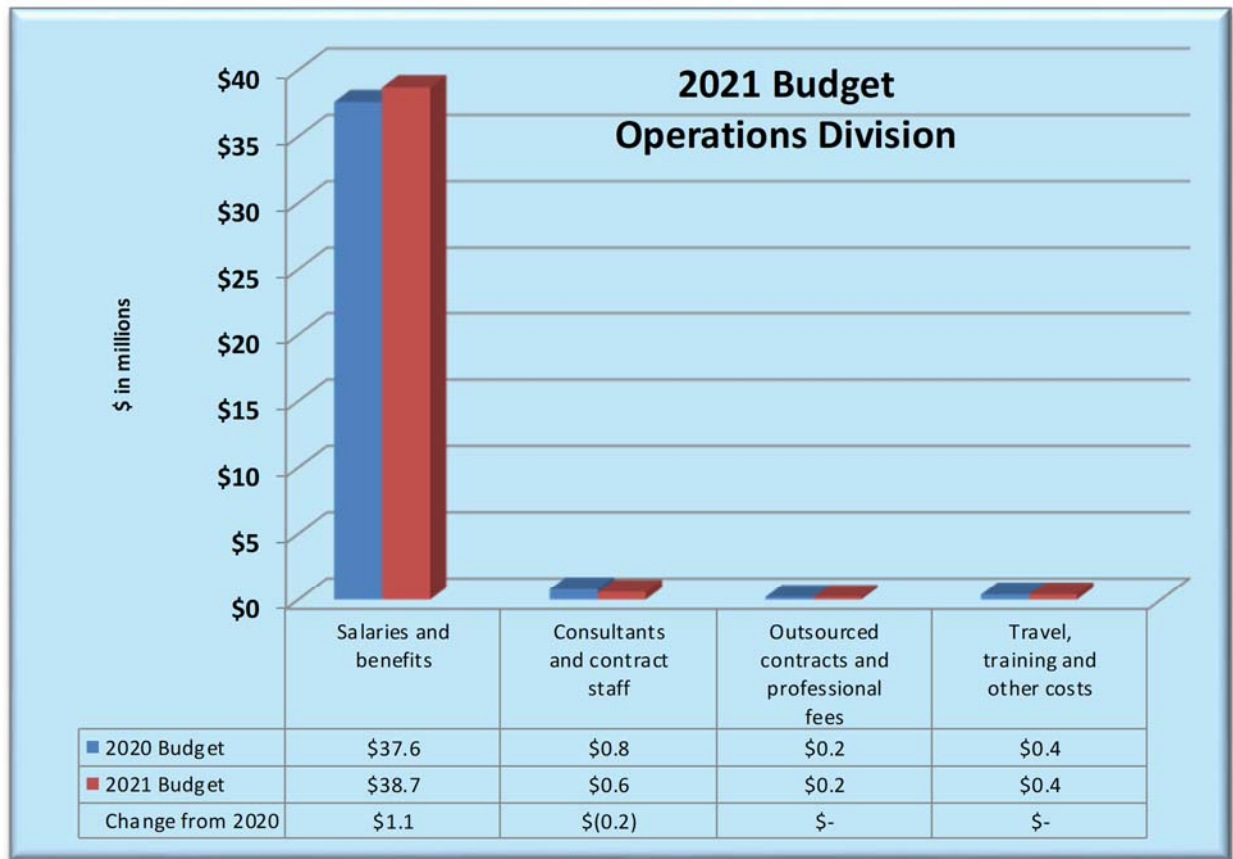
program, implementing operations change initiatives, maintaining operating procedures, and developing and delivering training.

The **Operations Compliance and Controls** department is responsible for the systematic approach to training (SAT) program, operations procedure control desk, operations compliance monitoring and reporting and the on-call emergency response coordinator program. The SAT program includes assessing new hire initial training and system operator continuous training needs. The certified SAT program provides NERC continuing education hours for ISO employees and customers, and is responsible for tracking ISO operator qualifications, overseeing the ADDIE process and overseeing compliance with PER-005 and other NERC standards, which include training requirements. The OCC team also supports RC West data exchange processes, the RC Portal, the RC West Oversight Committee, the RC Working Groups and NERC and tariff compliance for much of the Operations division - including the Real-Time Operations, Reliability Coordination, Operations Engineering Services, Operational Readiness and Model & Contract Implementation (Market Services) departments.

The **Market Services** department is responsible for a range of post-market and data modeling services. The team manages the congestion revenue rights (CRR) program, including model development, execution of auctions, and reporting on CRR market results. The department works with new ISO participants to arrange for the exchange of data used in the ISO network and market models, and supports existing participants in revising parameters for all related resources used in the markets. The department defines process for the certification of revenue quality meters, and collects and validates settlement-quality meter data for use in settlement calculations. The department designs and implements post-market policy changes to produce transparent, consistent, and efficient market settlement results, and is responsible for calculating and publishing those results with daily settlement statements. Other responsibilities include resolving settlement disputes, processing and reporting of market price corrections, and administering the rules of conduct program, which includes providing oversight of certain market participant behaviors.

Summary of Budget

The Operations division budget will increase by \$1.1 million to \$50.9 million for 2021. Staffing will increase by 1 to 163.



Salaries and benefits will increase by \$1.5 million due to budgeted merit increases and additional overtime.

Consultants and contract staff will decrease by \$0.2 million due to less backfill need and contract conversion staffing.

Travel, training, and other costs and outsourced contracts and professional fees will remain unchanged for 2021.

Market Policy and Performance Division

The Market Policy and Performance division is comprised of the Market and Infrastructure Policy department, Market Analysis and Forecasting department, and the California Regulatory Affairs group. The division regularly provides advice and in-depth analysis to state regulators on issues related to market efficiency and resource adequacy.

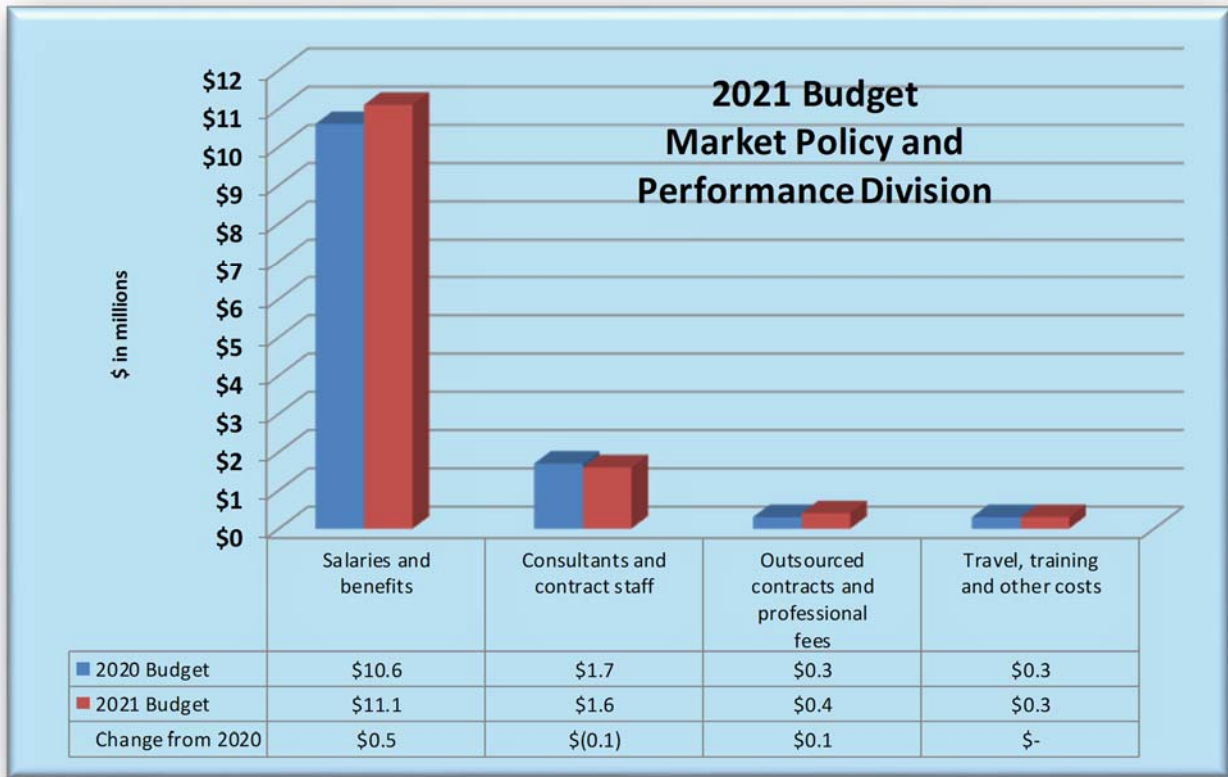
The **Market and Infrastructure Policy** department develops policies for new market products and enhancements to the existing market design to meet the changing needs of the grid. It also develops new policies for infrastructure development to better enable the rapid transition to a low carbon and reliable grid. The department is also responsible for refining the Western EIM processes and rules to promote an effective and transparent real-time market for EIM participants, which benefits the western U.S. interconnected grid. Market and Infrastructure Policy's current focus is developing the market mechanisms needed to expand elements of the ISO's day ahead market to balancing areas throughout the West.

The **Market Analysis and Forecasting** department assesses performance across the various ISO markets, which includes price analysis and validation to augment transparency and confidence in market results. It also tracks and reports on market performance through a series of reports and metrics. In doing so, it analyzes the market performance of the ISO's markets to identify inefficiencies and gaps for potential enhancements. It also supports the Market Infrastructure and Policy department with the analysis required to support policy initiatives. The department performs assessments and quantifies benefits related to the Western EIM. In addition to performing in-depth market analysis, the department uses advanced short-term demand and supply-forecasting technologies to ensure grid needs are met through the competitive wholesale energy market as well as assesses system flexibility to support integrating renewable resources.

The **California Regulatory Affairs** group builds and maintains relationships with regulatory agencies such as the California Public Utilities Commission, the California Energy Commission, and the California Air Resources Board, as well as monitors and manages regulatory matters that could influence ISO practices and policies

Summary of Budget

The Market Policy and Performance division budget will increase by \$0.5 million to \$13.4 million for 2021. Staffing will increase by 2 to 49.



Salaries and benefits will increase by \$0.5 million due to budgeted merit increases and additional headcount.

Consultants and contract staff will decrease nominally due to completion of various policy development efforts in 2020.

Outsourced contracts and professional fees will increase nominally due to increases for data subscriptions.

VI. Debt Service

The debt service amount included in the 2021 GMC revenue requirement is \$16.9 million, which remains the same as 2020. The amount includes the principal and interest payments due on the Series 2013 bonds and the 25% debt service reserve. The total equals the sum of the semi-annual interest payment due in August of the budget year, the principal and semi-annual interest payment due in February of the ensuing year, and the 25% debt service reserve amount required by the tariff and bond documents.

A summary of the debt service components is as follows.

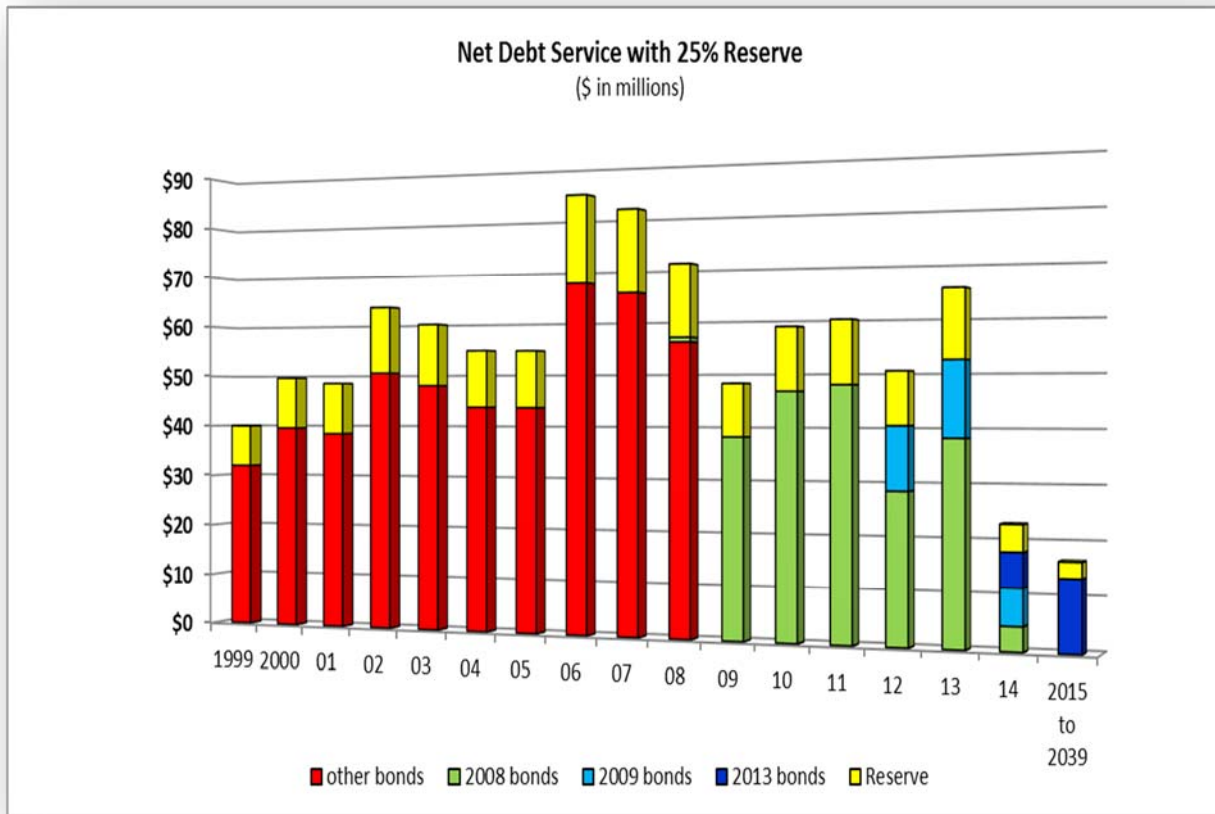
Debt Service (\$ in millions)	2021 Budget	2020 Budget	Change
Principal payments	\$5.6	\$5.4	\$0.2
Interest payments	7.9	8.1	(0.2)
Subtotal	13.5	13.5	-
25% debt service reserve	3.4	3.4	-
Total Debt Service	\$16.9	\$16.9	\$-

The Series 2013 bonds were issued in November 2013 to refinance the 2009 bonds. The 2009 bonds were issued to finance the ISO's headquarters facility in Folsom, California and to fund other capital expenditures. Below is the future amortization schedule for the 2013 bonds. Note: The bonds are callable on February 1, 2023.

Amortization Schedule for 2013 Bonds* (\$ in millions)	Principal	Interest	Total
2021	\$5.6	\$7.9	\$13.5
2022	5.9	7.6	13.5
2023	6.2	7.3	13.5
2024	6.5	7.0	13.5
2025-2039	133.8	55.5	189.3
Total	\$158.0	\$85.3	\$243.3

*The schedule portrays values assuming the GMC revenue requirement cycle.

The graph below provides a summary of the historical debt service.



VII. Capital / Project Budget and Cash-Funded Capital

The cash-funded capital component of the 2021 GMC revenue requirement is \$28 million. This component has been critical to the ISO's goal of maintaining a stable GMC revenue requirement. Historically, capital projects had largely been funded by debt financing. Beginning in 2010, the ISO converted debt service savings in the GMC revenue requirement to the cash-funded capital component. Using these collections as a way to finance capital projects removed the inefficiencies and costs associated with debt financing.

From the 2021 cash-funded capital component, the ISO is proposing a capital / project budget of \$22 million to fund projects such as those detailed on the following pages. The Board of Governors approval of the 2021 GMC revenue requirement will include this capital/project budget; the budget will be managed separately from the GMC revenue requirement.

The Corporate Management Committee (CMC) authorizes individual projects within the approved budget throughout the year. The CMC includes the Chief Executive Officer, VP - Chief Financial Officer and Treasurer, and VP - General Counsel and Chief Compliance Officer. The Board of Governors must approve any increases above the current year's approved budget.

Future annual capital / project budgets are estimated to be in the range of \$20 million - \$22 million per year and are funded through the cash-funded capital component of the GMC revenue requirement and its related reserves. Excess amounts in any given year are set aside for future projects, which enables the ISO to maintain a stable revenue requirement for an extended period.

Supplemental Projects

Several entities have signed EIM agreements for planned implementations in 2021 and 2022. The entities with planned implementations by 2021 include the Balancing Authority of Northern California (phase 2), Los Angeles Department of Water and Power, NorthWestern Energy, Public Service Company of New Mexico, and Turlock Irrigation District. The entities with planned implementation by 2022 include Avangrid, Avista, Bonneville Power Administration, Excel Energy- Colorado, Tacoma Power, and Tucson Electric Power. As outlined in the agreements, the EIM entities must reimburse the ISO for costs incurred for

their implementation. As the entities provide funding for their implementations, these implementation projects are not included in the annual capital / project budget.

Capital / Project Budget Development Process

The 2021 project prioritization process ran from July 2020 through November 2020. The Program Management Office collaborated with the internal business units and maintained a list of projects throughout the year. The list aligns with the corporate vision, the information technology roadmap, and the market initiatives roadmap. On a periodic basis, strategic initiative owners and managers review the progress of active projects, identify issues and risks, and propose changes to the master project list.

The project list is updated as part of the annual budgeting process to align the strategic projects scheduled for the following year. The projects are ranked to help determine the most important items, which results in an initial master list. The rating of each project is based on the criteria listed below. The ISO website contains additional project and release information⁴.

Ranking Criteria		
Strategy	Strategic Initiative	Weight
Compliance	Establish a culture of compliance	15%
Grid reliability	Enhances reliability of the grid by addressing and existing or potential operational issue	15%
Contributes to increased customer service		10%
Ensure continued reliability during grid transformation (capacity on the system)	Evolve the market	10%
	Markets and performance (MAP)	
	Develop infrastructure and tools	
Explore opportunities for regional collaboration and technological innovation	Incorporate renewable resources	10%
	Improve forecasting capabilities	
	MAP	
ISO process improvement	Process and quality	10%

⁴ The latest ISO release planning and project information is available on the ISO website at <http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>

Ranking Criteria		
Strategy	Strategic Initiative	Weight
Market efficiency	Addresses a current or potential market inefficiency	10%
Strengthen California’s global leadership commitment to renewable, responsible and reliable energy (regulatory coordination)	Advance state energy and environmental initiatives	10%
Development of staff / talent pipeline	People strategies	5%
Information Technology system qualities	System and tools	5%
Total Ranking Weight		100%

The business and financial case criteria follows:

- Does the project require development by market participants?
- Does the project deliver cost savings?
- How much are the project implementation costs?
- Does the project reduce operations and maintenance costs?
- Does the project mitigate any corporate risk?
- A factor for executive discretion is included.

Proposed Project List

The following list provides an indication of the final projects proposed for initiation during 2021 within the \$22 million project budget.

This year’s list includes the following four areas and initiatives:

- Market and operational excellence,
- Enhancement of the technology foundation,
- Focus on customer service and other costs, and
- Grid evolution readiness and regional innovation opportunities.

All projects that are ready for funding are presented to the CMC for consideration and approval. Items that the CMC consider include business case and cost-benefit to the

company and market participants. The CMC approves and monitors projects on a monthly basis.

The 2021 priorities may change depending on developments during the remainder of 2020 and into 2021. The actual projects completed during 2021 will vary, including the potential addition of projects currently not on the following list, the deferral of projects on this list to future years, or the elimination of projects deemed to be unnecessary.

Project costs are categorized as follows: small projects are under \$500,000, medium projects are from \$500,000 up to \$1 million, and large projects are over \$1 million.

Proposed Projects for 2021	Amount
Market and Operational Excellence	
Day ahead market (DAM) enhancements	Large
Extended day ahead market	Large
Operations and market services system improvements 2021	Large
Resource adequacy enhancements- track 1	Large
Settlements replacement	Large
Congestion revenue rights (CRR) system replacement	Medium
Energy management system (EMS) enhancements 2021	Medium
Energy storage and distributed energy resources (ESDER) phase 4	Medium
Reliability coordinator enhancements phase 2	Medium
Day ahead reliability tool phase 2	Small
FERC 831 - import bidding and market parameters	Small
Hybrid resources phase 2	Small
Imbalance conformance enhancements – user interface (UI)	Small
System market power mitigation phase 1	Small
Total Market and Operational Excellence	\$13,700,000
Enhance the Technology Foundation	
Miscellaneous hardware and software purchases	Large
Enterprise model management system (EMMS) phase 4	Medium
Program office internal labor	Medium
Technology systems improvements for production 2021	Medium
Access and identity management (AIM) improvements	Small

Proposed Projects for 2021	Amount
Initialization funding for capital projects	Small
Information technology robustness - Public Key Infrastructure (PKI) certificate usability	Small
Market software performance and robustness 2021	Small
Model synchronization and activation (MSAA) Phase 2	Small
Vendor portal for accounting	Small
Web service standardization	Small
Total Enhance the Technology Foundation	\$6,150,000
Focus on Customer Service and Other Costs	
Facilities replacement reserve	Large
Campus operations annual funding	Small
Centralized customer contacts	Small
Customer computer based training (CBT) program	Small
Customer service improvement projects	Small
Total Focus on Customer Service and Other Costs	\$2,000,000
Grid Evolution Readiness and Regional Innovation Opportunities	
Interconnection process enhancement 2021	Small
Total Grid Evolution Readiness and Regional Innovation Opportunities	\$150,000
Total Proposed Projects for 2021	\$22,000,000

VIII. Other Costs and Revenue

Other costs and revenue will increase by \$9.2 million to \$50.5 million, primarily due to increased revenues from the, new to 2021, Nodal Pricing Model fee and EIM administrative charges. This component, representing net revenues received outside of the GMC, lowers the overall GMC revenue requirement. By diversifying its revenue streams, the ISO is able to maintain a favorable revenue requirement (and ultimately favorable rates) while still developing well-rounded O&M and capital budgets that serves its needs.

The details of this category are as follows.

Other Costs and Revenue (\$ in millions)	2021 Budget	2020 Budget	Change
Reliability Coordinator Funding Requirement	\$18.0	\$18.5	(\$0.5)
Energy Imbalance Market Administrative Charges	11.4	9.5	1.9
Nodal Pricing Model Fee	8.4	-	8.4
Intermittent Resource Forecasting Fees	4.5	4.5	-
Interest Earnings	4.2	3.9	0.3
Generation Interconnection Project Fees	1.6	1.4	0.2
HANA Administrative Fees	0.9	0.9	-
Scheduling Coordinator Application and Other Fees	0.8	0.6	0.2
California-Oregon Intertie Path Operator Fees	0.7	2.0	(1.3)
Total Other Costs and Revenue	\$50.5	\$41.3	\$9.2

The 2021 RC funding requirement, calculated at \$18 million, represents the amount of revenue the ISO requires to offset the costs it will incur to provide RC services. The RC funding requirement is calculated as a percentage, known as the RC funding percentage, of the revenue requirement. The RC funding percentage is one of the cost category percentages analyzed in the triennial cost of service study. The results of the 2019 cost of service study indicated no change to the RC funding percentage was necessary; the funding percentage remains unchanged at 9%.

The 2021 RC funding requirement as a component of the total revenue requirement is shown below.

Revenue Requirement (\$ in millions)	RC %	2021 Budget
Operations and Maintenance Budget		\$ 200.8
Debt Service (including 25% reserve)		16.9
Cash Funded Capital		28.0
Other Costs and Revenues		(32.5)
Operating Costs Reserve Adjustment		(13.6)
Revenue Requirement (prior to RC Funding Requirement)		199.6
RC Funding Requirement for January - December 2021	9%	(18.0)
Total Revenue Requirement		\$ 181.6

EIM administrative charges are projected to increase to \$11.4 million in 2021 due to increased participation in the market. The Western EIM currently has ten participating members in eight western states and produced over \$1 billion dollars in gross benefits (as of the third quarter of 2020) since its launch in 2014. New participants scheduled for 2021 include Balancing Authority of Northern California (phase 2), Los Angeles Department of Water and Power, NorthWestern Energy, Public Service Company of New Mexico, and Turlock Irrigation District.

New to 2021 is the Nodal Pricing Model fee, which stems from an agreement between the ISO and PacifiCorp. Per the agreement, the ISO will modify its existing day-ahead optimization systems to provide a nodal pricing model solution for PacifiCorp. The ISO will produce separate day-ahead nodal pricing results within PacifiCorp's balancing authority areas (i.e., PacifiCorp East and PacifiCorp West), without a financial settlement or impact to the ISO's day-ahead market. The annual revenue to offset the costs necessary to provide this service is \$8.4 million.

Interest earnings are projected to increase to \$4.2 million due to larger investment balances.

Fees for conducting generator interconnection project studies are expected to increase slightly to \$1.6 million to reflect projected requests.

Scheduling coordinator application and other fees is expected to increase to \$0.8 million primarily due to the increase in application fees. The 2019 cost of service study results indicated resources to process the schedule coordinator applications and the CRR applications has increased. As such, the ISO is increasing the scheduling coordinator application fee to \$7,500 and the CRR application fee to \$5,000. These supplemental fees are designed to help recoup some of the costs that a new, or additional, scheduling coordinator or CRR customer has on systems and labor resources. While some of the costs are supported through the volumetric charges of the GMC, these supplemental fees represent a portion of the resource impact that any new entity, large or small, has on the ISO.

The ISO is proposing to decrease the California-Oregon intertie (COI) path operator fee from \$2 million to \$0.7 million. The fee reduction is primarily driven by the ISO's recent RC service provider offering; specifically, because some of the responsibilities as COI path operator and RC service provider are redundant. The fee reduction is also supported by the 2019 cost of service study results. The ISO is currently in the process of renegotiating the fee with the COI path operator agreement participants and filing the request with FERC.

All other components of this category are projected to remain unchanged.

IX. Operating Cost Reserve Adjustment

The operating cost reserve adjustment for 2021 will be a \$13.6 million credit. This amount will reduce the GMC revenue requirement. This component typically includes the following adjustments:

- An adjustment related to an increasing or decreasing O&M budget to ensure that the 15% reserve margin is maintained per the tariff.
- The return of the 25% debt service reserve collection from the prior year.
- The true-up of budget-to-actual revenues and expenses from the preceding audited year.⁵

A summary of the adjustment is below.

Operating Cost Reserve Adjustment (\$ in millions)	2021 Budget	2020 Budget	Change
Change in the 15% reserve for O&M budget	(\$0.9)	(\$0.9)	\$0.0
25% debt service collection from prior year	3.4	3.4	(0.0)
True-up of budget to actual revenues and other	11.1	9.1	2.0
Total Operating Cost Reserve Credit / (Debit)	\$13.6	\$11.6	\$2.0

The calculation of the 15% reserve adjustment is as follows.

Change in 15% Operating Reserve (\$ in millions)	2021 Budget	2020 Budget	Change
O&M budget	\$200.8	\$195.0	\$6.0
Operating Reserve percentage	15%		
Total Operating Reserve	\$30.1	\$29.2	\$0.9

⁵ See Attachment B, Calculation of Operating Cost Reserve Adjustment, for detailed calculation information.

X. Grid Management Charge and Other Calculations

The ISO recovers its GMC revenue requirement through unbundled grid management charges (GMC). Each unbundled service has a corresponding rate, which is paid by service users. Rates are calculated by dividing each service cost by its forecasted billing determinant volume. The result is a rate per unit of use. The current design, implemented in 2012, provides for three volumetric charges and five associated fees and charges. The cost categories consist of market services, system operations, and congestion revenue rights (CRR). The design was updated in 2015 and 2018 as a result of cost of service studies.

The ISO completed its most recent cost of service study in 2020; the study used activity based costing to analyze cost and time data from 2019. The new percentage allocations and fee changes as a result of the study will become effective January 1, 2021 and remain in effect through the development of the 2023 GMC revenue requirement and resulting charges.

The study results indicate a 17% shift of resources (time and dollars) from the system operations cost category to the market services cost category; the CRR service cost category percentage remains the same. The shift from the system operations cost category to the market services cost category is primarily driven by process efficiencies, system improvements, the introduction of the RC services cost category, and automation of services.

A summary of GMC cost category percentage changes is provided below.

Cost Category	2016 Study Effective 2018 GMC	2019 Study Effective 2021 GMC	Increase / (Decrease) from Prior
Market Services	32%	49%	17%
System Operations	66%	49%	-17%
CRR Services	2%	2%	0%

The results also indicate a shift of EIM related resources as well. The study shows that 16% of market services' resources shifted from the real time market functions to day ahead market functions. In addition, 11% of system operations' resources shifted from balancing authority functions to real time dispatch functions. The driver of the shifts is a balancing of efforts between the market services and system operations functions and responsibilities.

A summary of the EIM cost category percentage changes is provided below.

Cost Category	Sub-Category	2016 Study Effective 2018 GMC	2019 Study Effective 2021 GMC	Increase / (Decrease) from Prior
Market Services	Real Time Market	79%	63%	-16%
	Day Ahead Market	21%	37%	16%
System Operations	Real Time Dispatch	39%	50%	11%
	Balancing Authority	61%	50%	-11%

New to the triennial cost of service study is the analysis of RC services efforts. The study results indicate there is no change in the RC funding percentage from that of the initial calculation as part of ISO's Reliability Coordinator Rate Design, Terms and Conditions proposal; the funding percentage will remain at 9%.

The ISO also used the 2019 cost of service study to analyze efforts that support other supplemental services. The study results indicate resources to process statements increased. Whereas, resources to support transmission ownership rights (TOR) efforts decreased. The ISO is changing its Scheduling Coordinator ID fee and TOR fee based on the study results. The revenue collected from the fees offset the costs recovered through GMC rates.

A summary of the supplemental fee changes is provided below.

Fee	Cost Category Association	Billing Units	Current Fee	Updated Fee
Bid Segment Fee	Market Services	per bid segment	\$ 0.0050	No Change
Inter SC Trade Fee	Market Services	per Inter SC Trade	\$ 1.0000	No Change
SCID Monthly Fee	Market Services	per month	\$ 1,000	\$ 1,500
TOR Fee	System Operations	minimum of supply or demand TOR MWh	\$ 0.2400	\$ 0.1800
CRR Bid Fee	CRR Services	number of nominations and bids	\$ 1.00	No Change

Components of GMC and Billing Determinants

The three service categories, five associated fees and charges, and their billing determinants are as follows:

Type	Bill Determinant	Charge Code
Grid Management Charges		
Market Service Charge	Awards in MWh or MW of supply and demand excluding Transmission Ownership Rights (TORs)	4560
Systems Operations Charge	Metered flows in MWh of supply and demand in the ISO balancing authority with the following two exceptions, TORs and qualifying grandfathered supply contracts	4561
CRR Service Charge	MWh of congestion	4562
Miscellaneous Fixed Fees		
Bid Segment Fee	Number of bid segments in the ISO market for supply or demand	4515
Inter-SC Trades Fee	Number of trades by scheduling coordinator (SC)	4512
SCID Fee	Monthly charge if statement produced for an SC	4575
TOR Charge	Minimum of metered supply or demand in MWh on TORs	4563
CRR Auction Bid Fee	Number of accepted bids in CRR auctions	4516

Rate Calculation

There are eight steps to calculate rates, as noted below:

1. Estimate billing determinant volumes for fees and charges;
2. Multiply volumes by rates to derive revenues for individual fees and charges;
3. Allocate over or under collection of GMC revenue to the three service categories;
4. Allocate remaining GMC revenue requirement into three service categories;
5. Deduct fee and charge revenue from associated service category costs;
6. Estimate billing determinant volumes for three service categories;
7. Deduct grandfathered supply volumes from system operations charge; and
8. Divide residual GMC revenue requirement from step 4 by adjusted billing determinant volumes from steps 6 and 7 to derive individual service category rates⁶.

⁶ See Attachment C, Actual and Estimated Volumes, for detailed information.

Calculation of Service Category Rates

Component	Market Services	System Operations	CRR Services	Total
Allocation of Revenue Requirement (\$ in thousands)				
Total Revenue Requirement				\$181,676
Adjust for (over) /under collection of 2019 rates	\$537	\$1,480	(\$348)	1,669
Remaining to allocate				180,007
Percentages	49%	49%	2%	100%
% allocation of costs	88,203	88,203	3,601	180,007
Combined costs	88,740	89,683	3,253	181,676
Deduct Fee Revenue				
Bid Segment Fees	467	-	-	467
Inter-SC Trade Fees	2,593	-	-	2,593
SCID Fees	6,714	-	-	6,714
TOR Fees	-	725	-	725
CRR Auction Bid Fees	-	-	1,105	1,105
Total Fees	9,774	725	1,105	11,604
Calculation of Recoverable Costs				
Costs Less Fees	\$78,966	\$88,958	\$2,148	\$170,072
Projected MWh Volumes				
MWh Volumes	531,852,061	439,162,459	445,083,998	
Less grandfathered supply	-	-3,723,000	-	
Adjusted MWh Volumes	531,852,061	435,439,459	445,083,998	
Resulting Rates / MWh	\$0.1485	\$0.2043	\$0.0048	

Calculation of Fee Revenue

Fee	Rate	Estimated Volumes	Estimated Revenue (\$ in thousands)
Bid Segment Fees	\$0.0050	93,373,102	\$467
Inter-SC Trade	1.00	2,592,715	2,593
SCID Fees	1,500	373	6,714
TOR Fees	0.1800	4,025,215	725
CRR Auction Bid	1.00	1,105,328	1,105
Total			\$11,604

Summary of Rates

Comparison of GMC Revenue Requirements by Service Category

(\$ in millions)

Charge Code	Service Category or Fee	2021 Budget	2020 Budget	\$ Variance	% change
4560	Market Service Charge	\$79.0	\$52.4	\$26.6	50.8%
4561	Systems Operations	88.9	122.4	(33.5)	-27.4%
4562	CRR Services Charge	2.1	3.1	(1.0)	-32.3%
4515	Bid Segment Fees	0.5	0.4	0.1	25.0%
4512	Inter-SC Trades Fees	2.6	2.6	-	0.0%
4575	SCID Fees	6.7	4.2	2.5	59.5%
4563	TOR Charges	0.7	1.0	(0.3)	-30.0%
4516	CRR Auction Bid Fees	1.1	0.9	0.2	22.2%
Total		\$181.6	\$187.0	(\$5.4)	-2.9%

Comparison of Grid Management Charge Rates

(\$ per unit)

Charge Code	Service Category	2021 Rate	2020 Rate	\$ Variance	Comments
4560	Market Service Charge	\$0.1485	\$0.0994	\$0.0491	Rate increased compared to the 2020 rate due to the higher amount of GMC Revenue Requirement to collect for the Market Services cost category offset slightly by higher projected volumes.
4561	Systems Operations Charge	\$0.2043	\$0.2788	(\$0.0745)	Rate decreased compared to the 2020 rate due to the lower amount of GMC Revenue Requirement to collect for the System Operations cost category offset by lower projected volumes.
4562	CRR Services Charge	\$0.0048	\$0.0078	(\$0.0030)	Rate decreased compared to the 2020 rate due to the lower amount of GMC Revenue Requirement to collect for the CRR Services cost category and higher projected volumes.

EIM Administrative Rates

(\$ per unit)

Grid Management Charge	EIM Portion	2021		2020		\$ Variance
		% of GMC Service Charge	EIM Administrative Rates	% of GMC Service Charge	EIM Administrative Rates	
Market Services	Real Time Market	63%	\$ 0.0936	79%	\$ 0.0785	\$ 0.0150
System Operations	Real Time Dispatch	50%	\$ 0.1022	39%	\$ 0.1087	\$ (0.0066)

Reliability Coordinator Service Rates

(\$ per unit)

Reliability Coordinator Service Rate	
RC Funding Requirement (\$ in millions)	\$ 18.0
Projected Volumes in TWh	645.3
Projected RC Service Rate per MWh	\$ 0.0278

*Rate adjusted for minimum charges

Summary of Charges, Fees, and Supplemental Rates

(\$ per unit)

Charge Code	Summary of Charges, Fees, and Rates	2021 Rate	2020 Rate	Change \$	Billing Unit
Grid Management Charges					
4560	Market Service Charge	\$0.1485	\$0.0994	\$0.0491	per MWh
4561	Systems Operations Charge	\$0.2043	\$0.2788	(\$0.0745)	per MWh
4562	CRR Services Charge	\$0.0048	\$0.0078	(\$0.0030)	per MWh
Miscellaneous Fixed Fees					
701	EIR Forecast Fee	\$0.1000	\$0.1000	\$0.0000	per MWh
4512	Inter-SC Trade Fees	\$1.00	\$1.00	\$0	per # of trades
4515	Bid Segment Fees	\$0.0050	\$0.0050	\$0.0000	per # of bid segments
4516	CRR Auction Bid Fees	\$1.00	\$1.00	\$0.0000	per # of nominations and bids
4563	TOR Fees	\$0.1800	\$0.2400	(\$0.0600)	per MWh
4575	SCID Fees (monthly)	\$1,500	\$1,000	\$500	per # of SCID
Supplemental Services Rates					
4564	EIM Market Service	\$0.0936	\$0.0785	\$0.0150	per MWh
4564	EIM System Operations	\$0.1022	\$0.1087	(\$0.0066)	per MWh
5701	RC Service Rate	\$0.0278	\$0.0278	\$0.0000	per MWh



Calculation of Operating Cost Reserve Adjustment

(\$ in millions)

There are four factors that affect the calculation of the reserve adjustment:

- Prior year's 25% debt service reserve
- 2019 true-up
- 2020 estimates
- Change in the 15% operating cost reserve

Summary of Operating Cost Reserve Adjustment	If no changes to last years plan (a)	Budget to Actual (b)	Difference
Prior year's 25% debt service reserve collected	\$ 3,381	\$ 3,381	\$ -
2019 true-up	-	11,079	11,079
2020 estimates	-	-	-
Change in the 15% operating cost reserve	(878)	(878)	-
2021 Reserve credit / (debit) from 2019 operations	\$ 2,503	\$ 13,582	\$ 11,079
(a) Plan assumes prior year expenses and revenues were equal to budgeted amounts.			
(b) Revised reflects the true -up of prior year activities.			

Calculation of Operating Cost Reserve Adjustment

(\$ in millions)

2019 True Up			
Description	Budget	Actual	Difference
<u>Revenue</u>			
GMC revenue	\$ 193,563	\$ 192,597	\$ (966)
Other income	23,900	28,984	5,084
Realized gain on investments	-	534	534
Total revenue	217,463	222,114	4,651
<u>Expenses</u>			
Expenses	(189,030)	(180,274)	8,755
Debt service: principal	(4,970)	(5,510)	(540)
Debt service: interest	(8,457)	(8,043)	413
Debt service: reserve	(3,381)	(3,381)	-
Cash funded capital	(25,000)	(25,000)	-
Capital funded by EIM fees adjustment	-	(866)	(866)
Self-funded healthcare adjustment	-	(1,713)	(1,713)
Generator fines interest adjustment	-	379	379
Total expenses	(230,837)	(224,409)	6,428
<u>Impact to Operating Reserve</u>			
Net change in prior year true-up	\$ (13,374)	\$ (2,295)	\$ 11,079

Calculation of Operating Cost Reserve Adjustment

(\$ in millions)

2020 Estimates			
Description	Budget	Estimate	Difference
<u>Revenue</u>			
GMC revenue	\$ 186,943	\$ 186,943	\$ -
Other income	41,245	41,245	-
Total revenue	228,188	228,188	-
<u>Expenses</u>			
Operations and maintenance	(194,951)	(194,951)	-
Debt service: principal	(5,395)	(5,395)	-
Debt service: interest	(8,128)	(8,128)	-
Debt service: reserve	(3,381)	(3,381)	-
Cash funded capital	(28,000)	(28,000)	-
Total expenses	(239,855)	(239,855)	-
<u>Impact to Operating Reserve</u>			
Net change current year estimates	\$ (11,667)	\$ (11,667)	\$ -

Change in 15% Operating Cost Reserve			
Description	2020 Budget	2021 Budget	Change
Change in operations and maintenance budget from prior year	\$ 194,951	\$ 200,810	\$ 5,859
Change in the 15% operating cost reserve	\$ 29,243	\$ 30,121	\$ 878



Actual and Estimated Volumes

Note: Actual data may vary between reporting cycles due to recalculation of settlement statements.

Charge Type:	Market Services	System Operations	CRR Services	Inter-SC Trades	Bid Segment Fees	CRR Auction Bid Fees	TOR Fees	SCID Fees
Charge Code:	4560	4561	4562	4512	4515	4516	4563	4575
Unit:	MWh & MW	MWh	MWh	# of trades	# of bid segments	# of nominations & bids	Minimum of TOR supply & demand	# of SCID's

2017 Actual Units								
Jan-17	43,034,722	36,867,355	66,225,336	174,622	5,205,586	58,821	172,149	273
Feb-17	38,226,744	32,205,549	60,748,988	158,500	4,765,778	61,788	135,505	275
Mar-17	40,618,235	34,487,850	66,443,290	174,018	5,267,614	66,952	200,827	275
Apr-17	40,428,231	33,616,703	64,998,622	199,744	5,220,122	67,423	252,706	278
May-17	44,541,613	37,507,493	65,920,690	201,118	5,496,430	73,357	350,337	278
Jun-17	48,535,145	41,888,511	64,707,064	205,082	5,494,366	63,564	332,165	284
Jul-17	54,641,073	47,435,783	72,507,166	215,110	5,690,786	58,608	327,077	286
Aug-17	54,824,270	47,017,754	74,393,081	203,910	5,725,446	66,164	299,640	291
Sep-17	48,322,652	41,658,285	73,908,881	195,770	5,426,082	69,381	262,398	298
Oct-17	44,292,278	37,823,189	69,560,658	181,236	5,584,084	81,819	312,762	301
Nov-17	40,055,661	34,402,136	65,527,692	183,722	5,060,398	81,045	341,547	299
Dec-17	41,279,528	36,283,246	67,518,951	184,562	5,272,128	313,883	420,271	299
Total 2017	538,800,151	461,193,855	812,460,419	2,277,394	64,208,820	1,062,805	3,407,384	3,437

2018 Actual Units								
Jan-18	40,581,592	35,192,541	72,836,487	167,642	5,198,750	62,160	297,144	305
Feb-18	37,830,207	31,764,777	65,488,442	160,956	4,732,582	60,184	242,274	305
Mar-18	41,075,082	34,080,015	66,888,589	174,284	5,325,110	60,474	346,503	306
Apr-18	39,788,145	32,922,961	62,889,737	180,400	5,380,146	51,408	373,257	319
May-18	43,252,938	35,822,906	65,177,511	183,256	5,829,922	54,667	476,912	324
Jun-18	46,113,883	38,477,306	63,726,392	197,328	6,018,982	64,826	479,127	328
Jul-18	58,034,166	48,359,736	70,844,513	224,344	6,601,730	70,021	485,326	334
Aug-18	55,626,139	47,216,694	71,015,782	239,172	7,025,780	70,173	470,235	334
Sep-18	46,514,469	39,259,889	67,344,750	231,184	6,618,150	70,794	477,184	335
Oct-18	44,179,301	36,183,360	69,093,395	206,436	6,468,862	82,796	386,458	335
Nov-18	42,433,053	35,404,785	68,835,029	192,364	6,198,378	83,752	369,025	338
Dec-18	44,263,464	37,000,915	71,712,289	199,664	6,525,552	242,686	353,231	337
Total 2018	539,692,441	451,685,885	815,852,916	2,357,030	71,923,944	973,941	4,756,675	3,900



Actual and Estimated Volumes

Note: Actual data may vary between reporting cycles due to recalculation of settlement statements.

Charge Type:	Market Services	System Operations	CRR Services	Inter-SC Trades	Bid Segment Fees	CRR Auction Bid Fees	TOR Fees	SCID Fees
Charge Code:	4560	4561	4562	4512	4515	4516	4563	4575
Unit:	MWh & MW	MWh	MWh	# of trades	# of bid segments	# of nominations & bids	Minimum of TOR supply & demand	# of SCID's

2019 Actual Units								
Jan-19	41,815,480	34,655,055	30,711,450	199,888	6,631,928	48,219	392,081	333
Feb-19	39,653,349	32,824,285	28,479,230	182,352	5,904,408	45,923	280,273	340
Mar-19	41,464,915	34,246,402	32,135,302	215,758	6,364,278	48,944	319,007	336
Apr-19	41,038,111	33,537,971	30,801,634	218,624	6,336,702	49,792	391,675	341
May-19	42,656,660	34,572,893	32,270,261	238,124	6,739,848	49,674	375,021	341
Jun-19	44,829,442	37,986,834	34,142,961	247,422	6,823,450	61,827	425,206	347
Jul-19	51,704,117	43,890,820	34,755,542	266,350	7,264,290	65,050	449,136	347
Aug-19	52,126,205	45,428,668	35,838,863	266,286	7,301,898	64,480	442,601	347
Sep-19	48,703,414	40,939,527	35,267,279	245,008	7,449,976	63,156	402,080	352
Oct-19	43,277,367	35,280,527	35,282,066	231,452	7,538,132	76,363	315,697	353
Nov-19	39,898,532	33,324,137	34,562,683	209,116	7,050,626	113,734	208,144	354
Dec-19	42,031,831	35,851,869	35,274,639	219,260	7,317,016	250,670	312,996	351
Total 2019	529,199,424	442,538,989	399,521,910	2,739,640	82,722,552	937,832	4,313,917	4,142

2020 Actual Units from January to October & Estimate from November to December.								
Jan-20	40,933,378	34,402,100	34,139,627	203,592	7,127,726	57,321	262,412	347
Feb-20	38,685,078	31,846,684	33,113,372	195,080	6,681,572	59,891	235,599	347
Mar-20	41,464,915	34,246,402	37,559,372	212,542	6,949,844	66,811	304,051	345
Apr-20	41,038,111	33,537,971	36,615,491	223,346	7,079,984	71,004	345,003	352
May-20	42,656,660	34,572,893	37,206,301	230,566	7,597,150	77,359	429,484	357
Jun-20	45,360,913	37,717,056	41,018,642	231,626	7,850,368	82,039	462,134	359
Jul-20	51,758,190	43,525,511	40,238,159	247,282	8,171,918	77,179	447,867	371
Aug-20	55,638,003	46,969,266	39,573,606	247,266	7,316,208	75,999	402,681	366
Sep-20	50,028,191	41,207,830	38,026,171	231,544	6,780,340	77,539	373,734	364
Oct-20	45,378,848	37,497,170	35,299,599	222,458	6,790,348	94,395	328,980	359
Nov-20	37,983,905	31,106,221	34,713,562	204,544	6,099,284	88,858	301,877	364
Dec-20	42,626,240	35,097,831	37,580,097	231,630	6,509,937	276,933	273,246	362
Total 2020	533,552,432	441,726,934	445,083,998	2,681,476	84,954,679	1,105,328	4,167,067	4,293



Actual and Estimated Volumes

Note: Actual data may vary between reporting cycles due to recalculation of settlement statements.

Charge Type:	Market Services	System Operations	CRR Services	Inter-SC Trades	Bid Segment Fees	CRR Auction Bid Fees	TOR Fees	SCID Fees
Charge Code:	4560	4561	4562	4512	4515	4516	4563	4575
Unit:	MWh & MW	MWh	MWh	# of trades	# of bid segments	# of nominations & bids	Minimum of TOR supply & demand	# of SCID's

2021 Estimated Units								
Jan-21	40,802,928	33,912,425	34,139,627	190,374	7,834,035	57,321	253,479	364
Feb-21	38,561,793	31,393,383	33,113,372	179,463	7,343,670	59,891	227,579	364
Mar-21	41,332,771	33,758,944	37,559,372	200,861	7,638,526	66,811	293,700	364
Apr-21	40,907,328	33,060,596	36,615,491	207,457	7,781,562	71,004	333,258	370
May-21	42,520,718	34,080,788	37,206,301	217,315	8,349,975	77,359	414,864	370
Jun-21	45,216,353	37,180,197	41,018,642	225,459	8,628,285	82,039	446,402	370
Jul-21	51,593,242	42,905,975	40,238,159	245,992	8,981,699	77,179	432,621	378
Aug-21	55,460,691	46,300,713	39,573,606	250,908	8,041,194	75,999	388,973	378
Sep-21	49,868,757	40,621,284	38,026,171	235,912	7,452,225	77,539	361,012	378
Oct-21	45,234,231	36,963,441	35,299,599	220,115	7,463,225	94,395	317,781	380
Nov-21	37,862,855	30,663,459	34,713,562	202,008	6,703,681	88,858	291,601	380
Dec-21	42,490,395	34,598,254	37,580,097	216,851	7,155,026	276,933	263,944	380
Total 2021	531,852,061	435,439,459	445,083,998	2,592,715	93,373,102	1,105,328	4,025,215	4,476

Change from 2017 Actual	-1.3%	-5.6%	-45.2%	13.8%	45.4%	4.0%	18.1%	30.2%
Change from 2018 Actual	-1.5%	-3.6%	-45.4%	10.0%	29.8%	13.5%	-15.4%	14.8%
Change from 2019 Actual	0.5%	-1.6%	11.4%	-5.4%	12.9%	17.9%	-6.7%	8.1%
Change from 2020 Actual + Estimate	-0.3%	-1.4%	0.0%	-3.3%	9.9%	0.0%	-3.4%	4.3%

[The latest GMC rates as well as a history of the rates is available on the Grid Management Charge page on the CAISO public site.](#)