

2019

BUDGET AND GRID MANAGEMENT CHARGE RATES

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



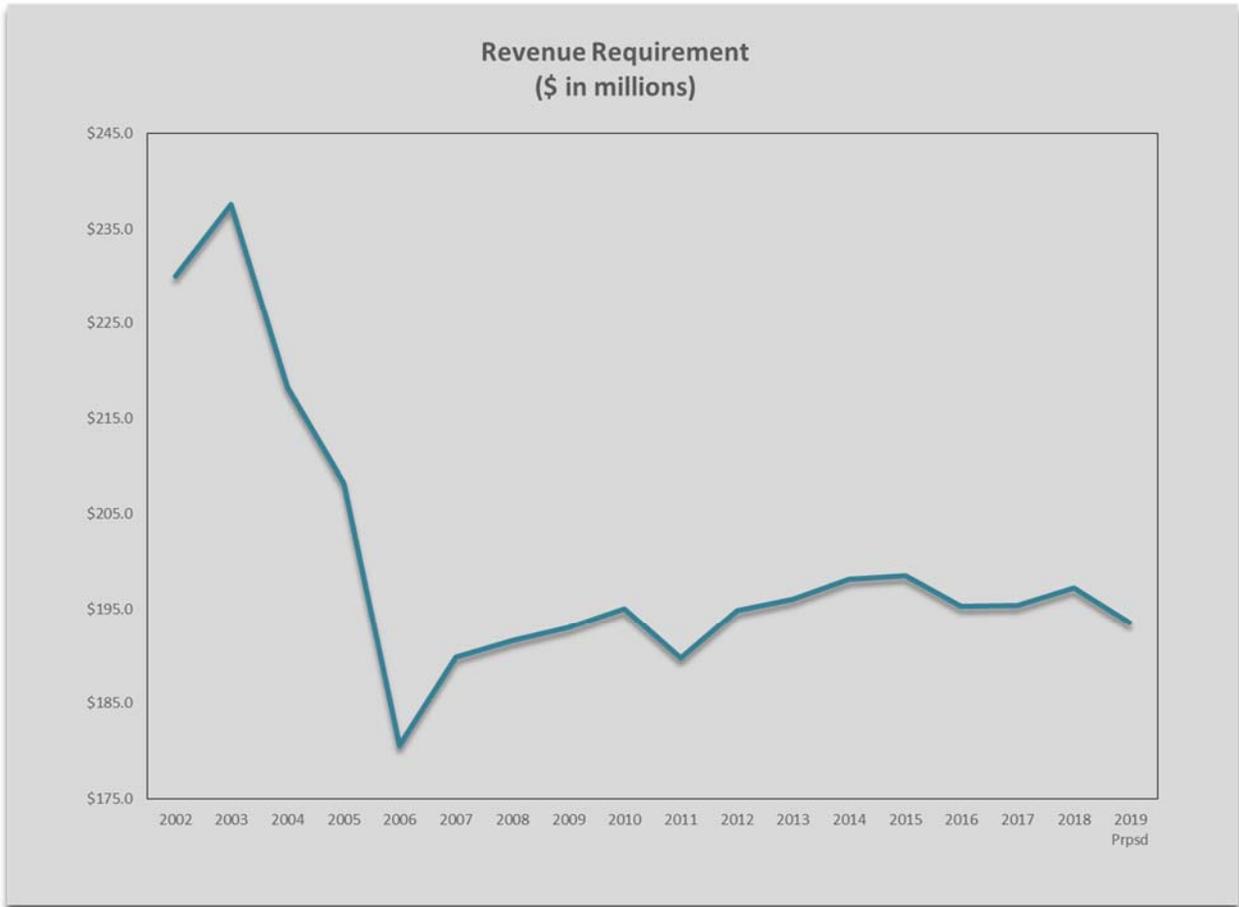
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I. 2019 GMC Revenue Requirement

The 2019 budget results in a GMC revenue requirement of \$193.5 million, which represents a 1.9% decrease from 2018. Fiscal discipline remains a priority for the California Independent System Operator Corporation (ISO) as evidenced by the continued stability of the GMC revenue requirement. Since 2007, the GMC revenue requirement has averaged an annual increase of less than 1% and remains 18.5% lower than the peak in 2003. The ISO has absorbed several major initiatives during this time with no material impact to the GMC revenue requirement, which included launching the new market, constructing its secure primary and secondary locations, as well as implementing the Western Energy Imbalance Market (EIM).



Components of 2019 GMC Revenue Requirement

A summary of the 2019 GMC revenue requirement compared to 2018 follows.

Revenue Requirement Components (\$ in millions)	2019 Budget	2018 Budget	Change \$
Operations & Maintenance Budget	\$189.0	\$178.5	\$10.5
Debt Service (including 25% reserve)	16.9	16.9	0.0
Cash Funded Capital	25.0	22.0	3.0
Other Costs and Revenues	(23.9)	(16.7)	(7.2)
Operating Costs Reserve Adjustment	(13.5)	(3.5)	(10.0)
Total Revenue Requirement	\$193.5	\$197.2	(\$3.7)
Transmission Volume in TWh	239.7	241.3	(1.6)
Pro-forma bundled cost per MWh	\$0.807	\$0.817	(\$0.010)

The operations and maintenance (O&M) budget is the major component of the GMC revenue requirement; therefore, managing it is critical to keeping a stable revenue requirement. At \$189 million, this component makes up 98% of the 2019 GMC revenue requirement. The \$10.5 million projected increase in the O&M budget, as in recent years, is primarily related to labor costs. In addition to merit adjustments, promotions, and benefit costs increases, the 2019 budget allows for an additional 28 full time positions. The majority of these positions are in support of the ISO Reliability Coordinator (RC) services kicking off in 2019.

Despite the increases projected in the O&M budget, the overall GMC revenue requirement is projected to decline by \$3.7 million from 2018 as other revenue and the operating costs reserve adjustment are budgeted to increase by approximately \$17.2 million combined in 2019.

The ISO projects that the 2019 transmission volumes will be 239.7 TWh, which is a decrease from projected 2018 volumes. The projected volumes are based on the three-year average of actual measured demand volumes as well as year-to-date 2018 volumes. The reduced volumes result in a projected pro-forma bundled cost per megawatt-hour (MWh) of \$0.807, or a decrease of \$0.010 per MWh from 2018.

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). The market services charge applies to megawatt-hours (MWh) and megawatts (MW) of awarded supply and demand in the ISO market. The systems operations charge applies to MWh of metered supply and demand in the ISO controlled grid. The CRR services charge applies to MWh of congestion.

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. Section X of this document outlines the determination of GMC 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 and 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 costs incurred for ongoing operations. The 2019 O&M budget of \$189 million is \$10.5 million greater than the 2018 O&M budget of \$178.5 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 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 fund other capital expenditures). The total debt service to be collected in the 2019 GMC revenue requirement (\$16.9 million) remains unchanged from 2018.

Cash funded capital included in the GMC revenue requirement is \$25 million with any unencumbered amounts carried over to fund future years' capital requirements. Collecting capital as a component of the GMC revenue requirement avoids additional costs with tax-exempt debt financing, which includes debt issuance costs, interest expense and the 25% debt service reserve.

Capital and project requirements for 2019 are budgeted for \$22 million. Significant work is anticipated for 2019 (as shown in the proposed project list in Section VII). This work includes the systems development related to expanding market capabilities and integrating renewable resources.

Other costs and revenues are offsets to the GMC revenue requirement and are budgeted to increase \$7.2 million in 2019 (to \$23.9 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, large generator interconnection fees, and other revenues.

The operating cost reserve adjustment is a credit of \$13.5 million in 2019. 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 2018 and the difference between the budgeted and actual revenues and expenses from 2017.

Budget Guidance

The ISO held its budget kick-off meeting with stakeholders in July 2018 with the clear intent to consider stakeholder input when building the 2019 budget. Notes from that discussion and subsequent stakeholder meetings are available on the ISO website¹. Based on a firm commitment to fiscal responsibility, the ISO's leadership team required each division to develop an O&M budget consistent with the corporate vision.

The combined efforts led the 2019 GMC revenue requirement to come in at \$193.5 million, approximately \$8.5 million less than the FERC approved \$202 million cap. The budget funds operations and initiatives as set forth in the ISO vision as described below.

Strategic Outlook

The ISO is tireless in meeting its responsibility to maintain the reliability of the high voltage grid that serves California and market participants throughout the West. Over the past several years, the ISO has been creating power markets and a grid infrastructure that efficiently uses renewable resources while strengthening system resiliency, all to the benefit of consumers.

At this time, the ISO grid has about 22,000 megawatts (MW) renewable generation connected to the grid, including about 11,500 MW of solar and nearly 6,300 MW of wind-powered capacity.

The ISO is closely collaborating with generators, utilities, transmission owners, energy regulators and diverse stakeholder groups, in creating a grid and market structure that encourages Distributed Energy Resources (DERs), such as battery storage, rooftop solar and electric vehicles. Federal regulators approved in early 2018 ISO tariff enhancements in which entrepreneurs and utilities can bundle, or aggregate DERs so that they can participate in the ISO wholesale market just like a traditional utility-scale generator. This enhancement to market rules provides needed supply and liquidity to the market, as well as

¹ The 2019 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>.

supports a more secure and sustainable electric generation and power delivery system. In addition, DERs reduce carbon emissions and contribute to meeting state clean air goals.

In addition, the ISO took steps in 2018 to become its own reliability coordinator (RC) and offer these services to other balancing authorities in the western United States. The ISO filed its proposed RC rate design, terms and conditions with FERC in August 2018. FERC approved the ISO filing on November 14, 2018².

Aligning with the ISO's Vision

The ISO is committed to supporting growth and change while carefully managing its own 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 2019 budget aligns with the ISO vision, which is a guide to meet organizational and operational goals. The plan contains the following three strategies:

1. efficiently managing a low carbon grid by leveraging and improving our capabilities and maximizing the capabilities of renewables, the transmission system, and the energy imbalance market;
2. adapting to a changing environment that encourages distributed energy resources and emerging service providers; and,
3. evolve the western energy market in collaboration with our partners and a commitment to mutual success.

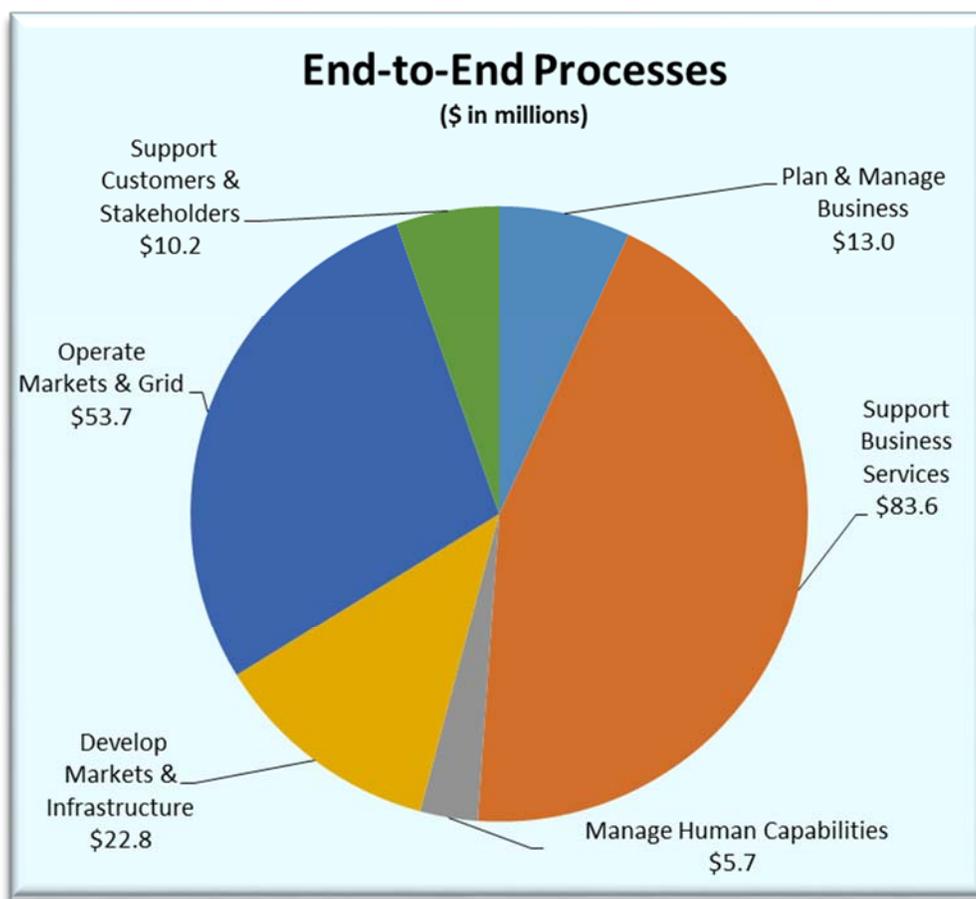
The ISO vision provides employees and managers our common goals while the budget explains how the corporation funds and allocates its resources to support its business plans. The 2019 budget is built upon a balanced mix of staffing, skills and financial resources.

Aligning the strategic planning process more closely with budget planning provides greater transparency into the ISO's resources as well as associated costs for business and operational activities. The ISO remains steadfast in its efforts to manage costs and emphasizes using corporate resources in a smart and prudent manner.

² The latest on the ISO Reliability Coordinator services initiative is available on the ISO website at <http://www.caiso.com/informed/Pages/ReliabilityCoordinator/Default.aspx> .

III. Process View

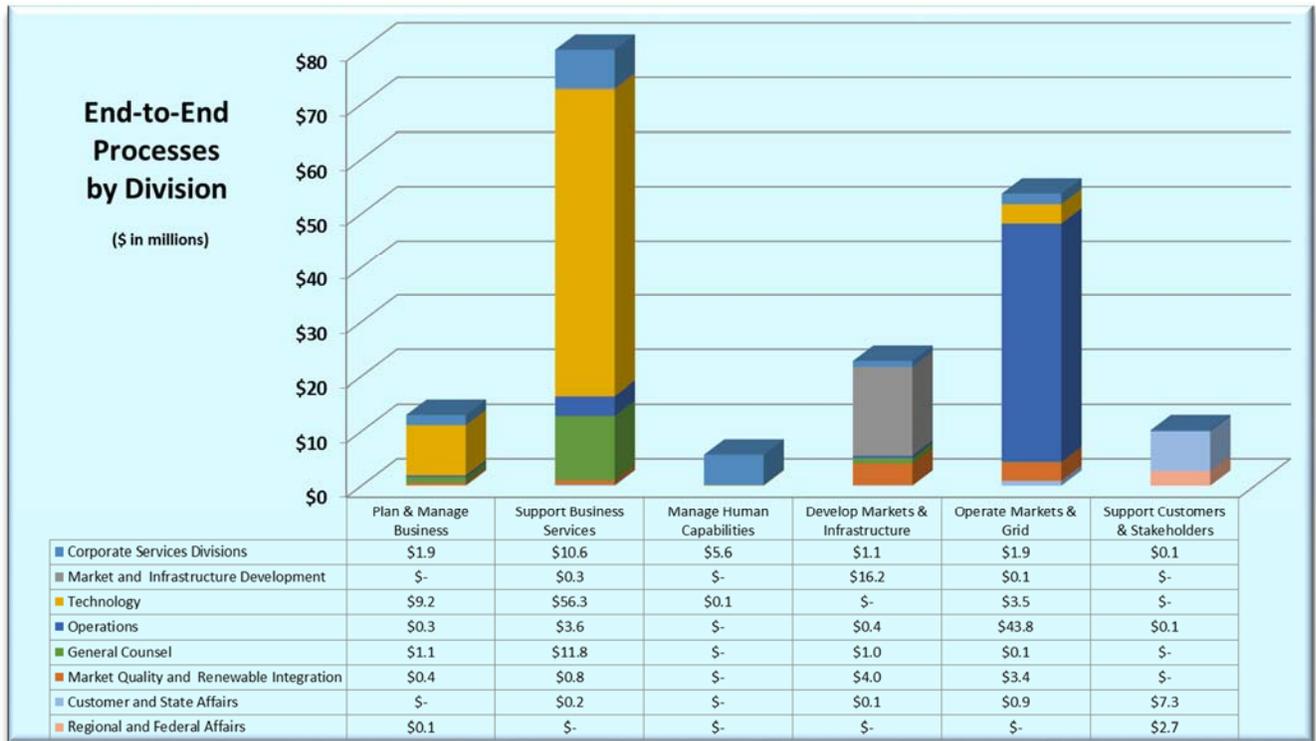
The ISO has leveraged the activity-based costing system to provide greater transparency and granularity in how the budget supports corporate business plans. In support of this system all employees record time worked to second level activities under nine primary processes. For purposes of this presentation, the nine processes are grouped into six processes. Aggregating the time reported by employees results in percentages for each of the processes (the hours from the first nine months of 2018 were used). Applying these hours to the proposed 2019 budget results in costs for the six processes as shown below.



- **Plan and manage business** — strategic planning, governance, budgeting and project management;
- **Support business services** — general, information technology, financial, legal and compliance support services;
- **Manage human capabilities** — employee lifecycle, training and organizational development;
- **Develop markets and infrastructure** — regulatory, market, policy and product design and transmission planning, grid asset reviews and interconnection studies;

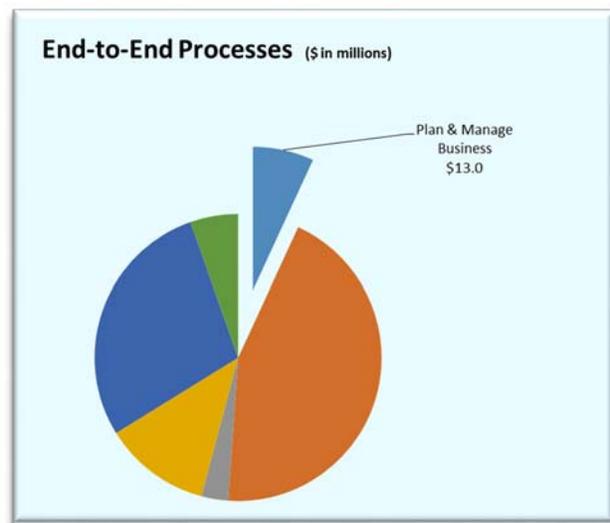
- **Operate markets and grid** — manage and operate the markets including modeling, setup, and settlements; and
- **Support customers and stakeholders** — client, account and stakeholder processes, government affairs and communications.

Division costs are allocated into the end-to-end processes as follows.



Plan and Manage Business

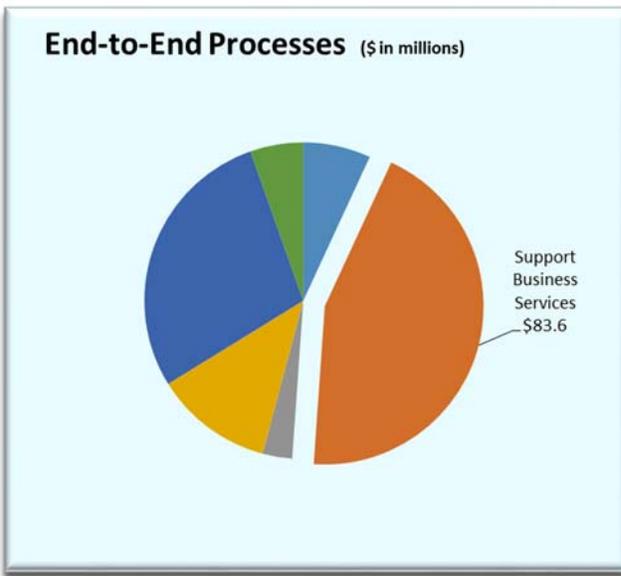
The **plan and manage business** process, amounting to \$13.0 million and 37 staff, consists primarily of the efforts of the Technology, Finance and General Counsel divisions with elements of the Operations, Market Quality and Renewable Integration, and Regional and Federal Affairs divisions. The ISO measures every process, project or policy against identified benefits. This activity finds support in part by aligning the strategic planning process with budget planning, as outlined in Section II: Aligning with the ISO's Strategic Plan.



It is the budget process that drives GMC revenue requirement needs, which then translates into the rates charged to scheduling coordinators and other market participants.

Support Business Services

The **support business services** process, amounting to \$83.6 million and 241 staff, is comprised primarily of functionalities of the Technology, General Counsel, Finance, and Operations divisions with elements of all other divisions with the exception of Regional and Federal Affairs division.



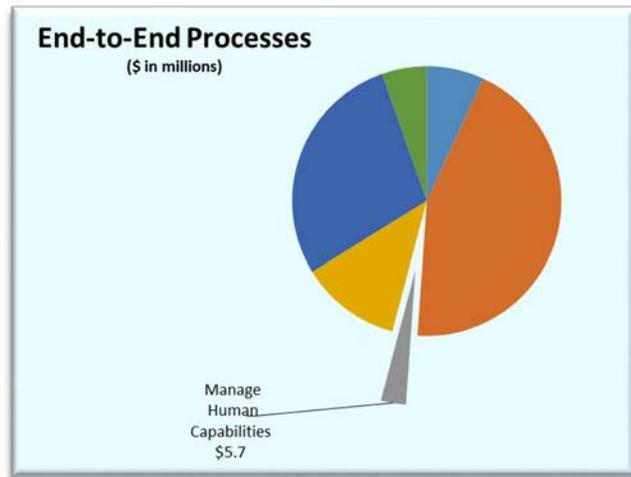
This process establishes the ISO's ability to carry out its business duties by developing well defined, measured and controlled processes (workflow and information technology), as well as nurturing disciplined business decision making, maintaining quality assurance and efficiently implementing enhancements.

In addition, this process supports the initiatives that improve and maintain a responsive and effective compliance culture.

Manage Human Capabilities

The **manage human capabilities** process, amounting to \$5.7 million and 14 staff, consists of the efforts of the Human Resources division along with elements from the Technology division. It 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.

The budget supports the ISO's ability to attract and retain uniquely skilled and highly sought-after professionals by continually assessing the quality of compensation and benefit packages. The benefits menu reflects cost containment measures while at the same time preserving the competitive options needed to meet the needs of a diverse employee population.



It is a top corporate priority to ensure the ISO is equipped with the knowledge, skills and expertise to meet the increasingly complex challenges of a changing industry landscape. The budget provides resources to help employees not only grow in their jobs but also increase their value to the corporation.

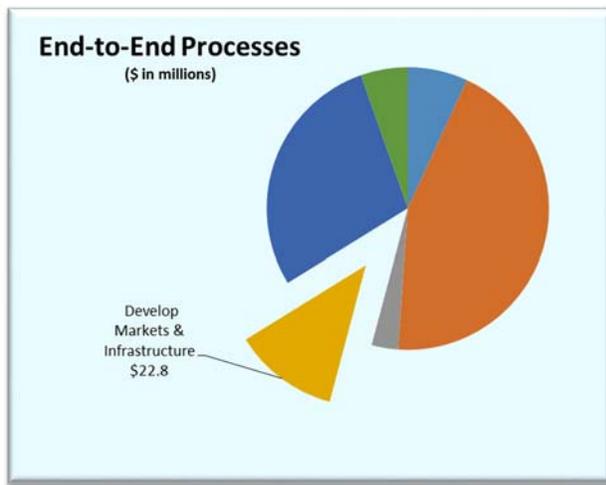
In addition, the budget provides resources to support management and employees in maintaining a high-performance and respectful workplace environment where employees are motivated to pursue their highest potential as well as contribute to the corporation's success.

Develop Markets and Infrastructure

The **develop markets and infrastructure** process group, amounting to \$22.8 million and 87 staff, includes two separate processes that support the creation of value-added enhancements to the market design, as well as proactively plan and facilitate grid upgrades, such as those needed to reliably integrate renewable resources.

Develop Markets

Develop markets, amounting to \$10.6 million and 39 staff, consists primarily of the efforts of the Market Infrastructure and Development, Market Quality and Renewable Integration divisions with elements of all other divisions with the exception of the Regional and Federal Affairs and Technology divisions.



This activity includes enhancing our abilities to review and analyze the efficiency and quality of market results, as well as identifying needed market design improvements that increase efficiencies and transparency.

Initiatives under this banner include creating the business and operational frameworks that support demand response and renewable resources in the ISO market, and provide the rules for distributed generation,

energy efficiency and energy storage participation.

Develop Infrastructure

Develop infrastructure, amounting to \$12.2 million and 48 staff, consists primarily of the efforts of the Market Infrastructure and Development division and elements of the Market Quality and Renewable Integration and Chief Executive Officer divisions. The budget supports a comprehensive approach to transmission and generation interconnection planning that considers reliability and public policy needs.

Operate Markets and Grid

Three end-to-end processes make up the **operate markets and grid** process group: 1) manage market and reliability data and modeling; 2) manage markets and grid; and 3) manage operations support and settlements. The group budget totals \$53.7 million and 228 staff.

Manage Market and Reliability Data and Modeling

Manage market and reliability data and modeling, amounting to \$14.9 million and 62 staff, is primarily comprised of functionalities of the Operations, Chief Executive Officer and Technology divisions with elements of the Customer and State Affairs, Market Quality and Renewable Integration, and Market and Infrastructure Development divisions.

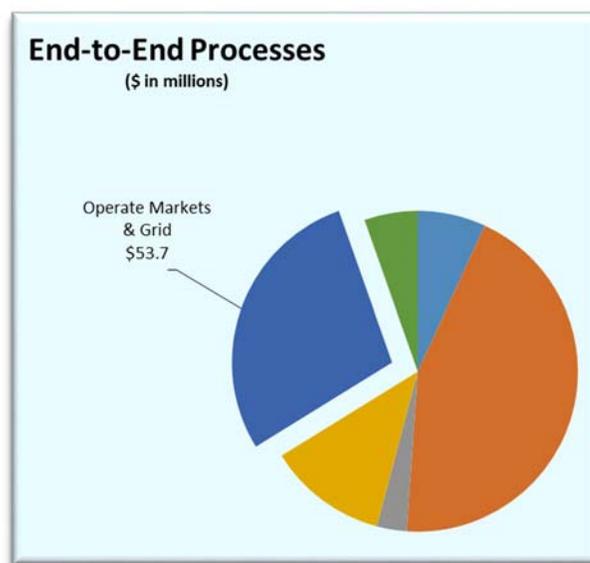
The ISO carefully re-evaluates its network modeling policies and protocols to find ways to reduce out-of-market energy dispatches, assure models reflect all grid constraints and produce timely and accurate prices.

Manage Markets and Grid

Manage markets and grid, amounting to \$26.3 million and 115 staff, is primarily comprised of functionalities of the Operations and Technology divisions with elements of the Market Quality and Renewable Integration division. One of the ISO's major duties is to manage transmission and generation outages, especially those that are unplanned, as it takes well-honed grid expertise to ensure continuous flow of power to all consumers. Managing the market includes running the day-ahead market and interchange scheduling so that all local energy needs are met and the power is delivered at the most reasonable cost.

Manage Operations Support and Settlements

Manage operations support and settlements, amounting to \$12.6 million and 51 staff, is mostly comprised of functionalities of the Operations and Market Quality and Renewable Integration divisions along with elements of the Technology, Chief Executive Officer, and General Counsel divisions. The budget provides the resources that result in creating new market efficiencies. This effort includes lowering the financial risk of participating in the wholesale market and in turn lowers the cost of doing business with the ISO.



Support Customers and Stakeholders

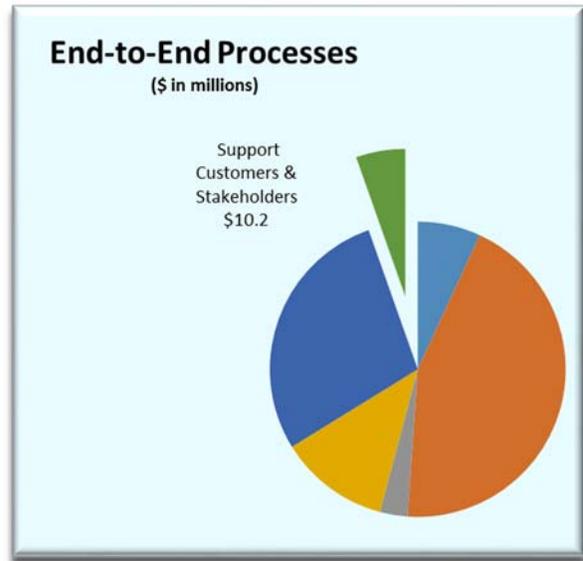
The **support customers and stakeholders** process, amounting to \$10.2 million and 36 staff, consists primarily of the efforts of the Customer and State Affairs and Regional and Federal Affairs divisions along with elements of the Operations and Chief Executive Officer divisions.

The ISO is diligent in providing the highest quality of service to its market participants and stakeholders. This includes resolving customer issues in a timely manner and streamlining access to market information when possible.

This process improves the overall business experience stakeholders and market participants have with the ISO, as well as sharing clear corporate and business information. The ISO is dutiful in quickly resolving inquiries and encouraging quality dialogue with its key

customers. This activity also provides the framework to make improvements in the stakeholder processes as well as build proactive outreach to new market participants that, in turn, supports their active participation in the wholesale market.

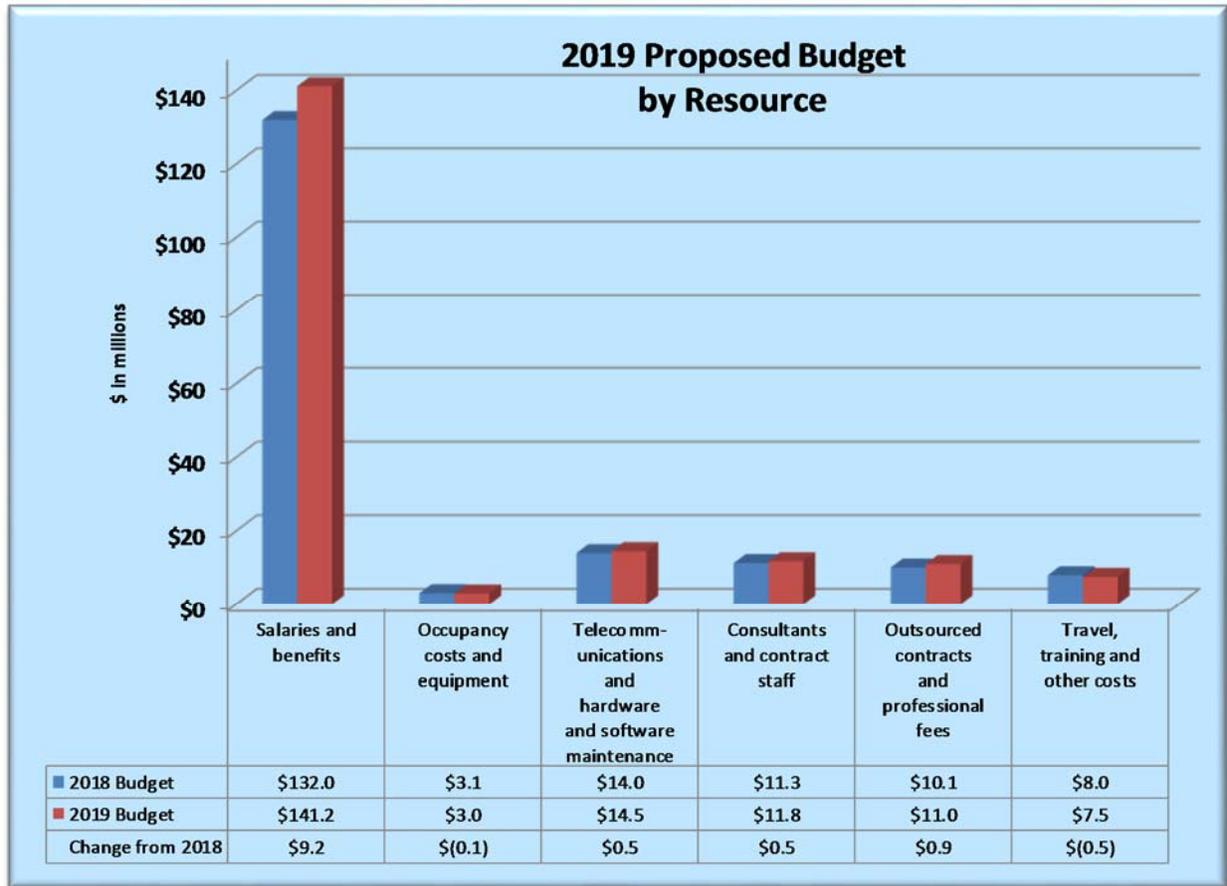
The government affairs department is active in effectively sharing ISO technical expertise and communicating advice to government and regulatory bodies to help inform and advance policies and mandates that protect grid reliability.



IV. ISO Resource Utilization

This section deals with the resources used in the O&M budget to accomplish strategic objectives and goals. The 2018 budget reflects reclassifications in order for it to be comparable to the 2019 budget presentation.

The chart below shows the major resource components.



Salaries and Benefits

The ISO depends on its highly educated employees to operate the grid and support market functions, which makes staff a critically important resource with salaries and benefits comprising 74% of the 2019 and 2018 O&M 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 Plan, and better reflect end-to-end business processes.

The budgeted staffing level for 2019 is 643 employees. The staffing level has increased by 28 from the budgeted 2018 staffing level primarily to address resource needs driven by offering RC services beginning in 2019.

There is no provision for vacancies in the 2019 budget as the number of projected full time employees as we head into 2019 is expected to equal the proposed 2019 staffing level.

A summary of the budgeted headcount for 2019 and 2018 is as follows.

Projected Staffing Levels	2019 Budget	2018 Budget	Change
Corporate Services Divisions	54	52	2
Market and Infrastructure Development	67	67	-
Technology	202	195	7
Operations	217	199	18
General Counsel	34	34	-
Market Quality and Renewable Integration	27	27	-
Customer and State Affairs	35	34	1
Regional and Federal Affairs	7	7	-
Gross Headcount	643	615	28
Less Program Office Staff Included in Capital	(5)	(5)	-
Net Headcount	638	610	28

Staffing Related to Capital

As in past years, the O&M budget does not include the costs of staff dedicated full-time to capital projects, which are components of a separate capital budget. The capitalized staff amounted 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 2019 compensation budget includes funding for employee base salaries, benefits and payroll taxes, as well as other compensation elements, such as overtime and performance compensation, and related costs such as relocation and tuition reimbursement. The budget also includes funds for 2019 salary adjustments for merit, equity and market adjustments; as well as for increased healthcare costs. 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)	2019 Budget	2018 Budget	Change
Base Compensation	\$115.4	\$108.8	\$6.6
Overtime (includes structured overtime for grid operators)	\$7.2	\$6.0	\$1.2
Performance Compensation	\$16.8	\$15.8	\$1.0
Other	\$1.8	\$1.4	\$0.4
Total Personnel Expense	\$141.2	\$132.0	\$9.2

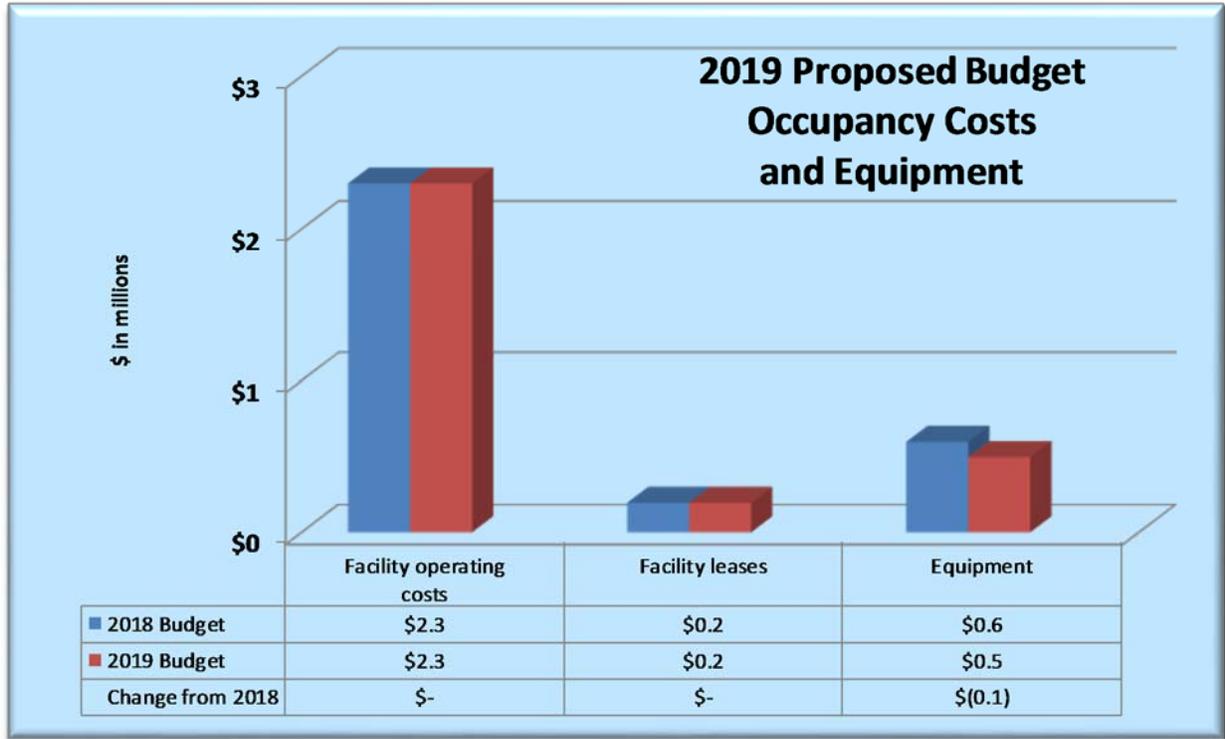
Employee benefits are budgeted at 38% of salary costs as summarized in the table below. The 2019 rate has increased 2% above the 2018 level. This is primarily due to upward cost pressure in the healthcare market as a whole. Management will enter into contracts with selected vendors to ensure these benefits 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 and Welfare Plans Medical, Dental and Vision	Medical, dental and vision; life, accidental death and long-term disability insurance; state unemployment insurance; and worker's compensation	16%
Retirement Benefit Plans	Retirement Savings Benefit Plan 401(k); Federal social security and Medicare; executive retirement plans; and retiree medical benefit plan	22%
Benefit Burden Rate		38%

Occupancy Costs and Equipment

Occupancy costs and equipment have decreased \$0.1 million, or 2%, to \$3.0 million for 2019 compared to \$3.1 million in 2018. These costs comprise approximately 2% of the 2019 and 2018 budget.



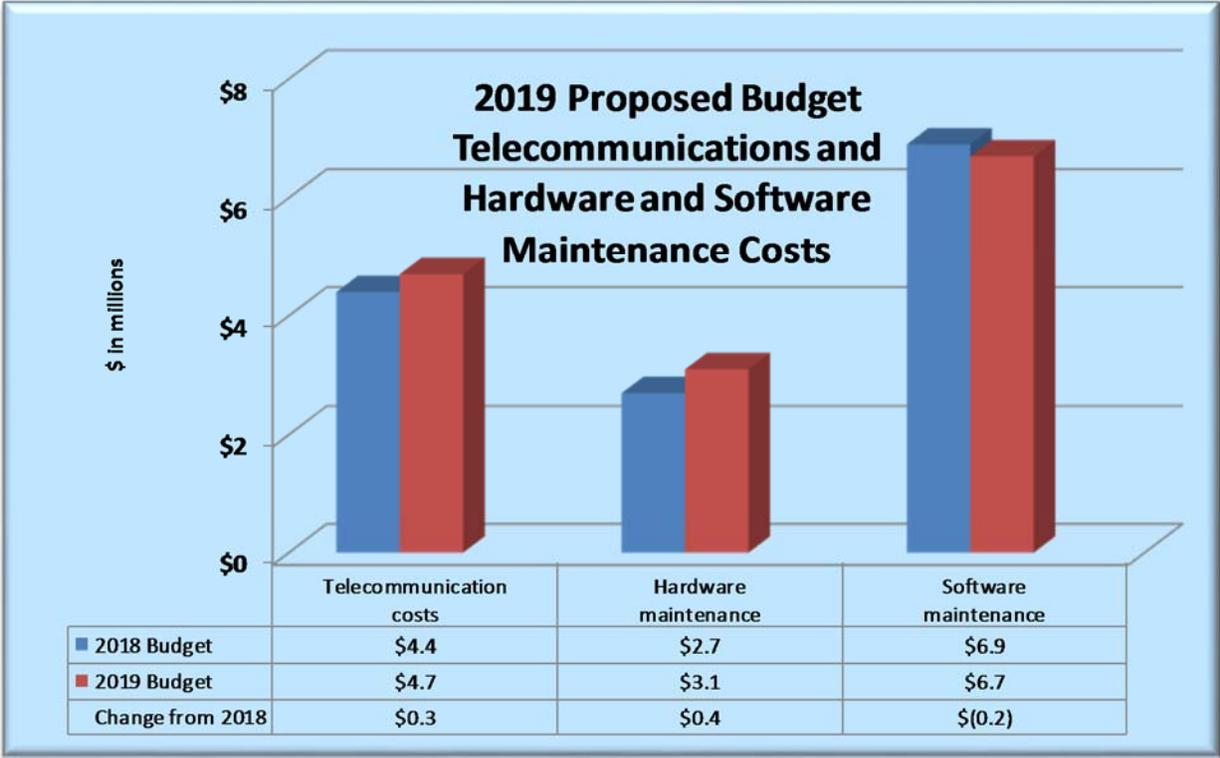
Facility operating costs remain unchanged at \$2.3 million in 2019.

Facility leases remain unchanged at \$0.2 million in 2019.

Equipment expense decreased by \$0.1 million, or 20%, to \$0.5 million in 2019 from \$0.6 million in 2018.

Telecommunications and Hardware and Software Maintenance Costs

Telecommunications and hardware and software maintenance costs increased \$0.5 million, or 3%, to \$14.5 million for 2019 compared to \$14.0 million in 2018. These costs comprise approximately 8% of the 2019 and 2018 budgets.

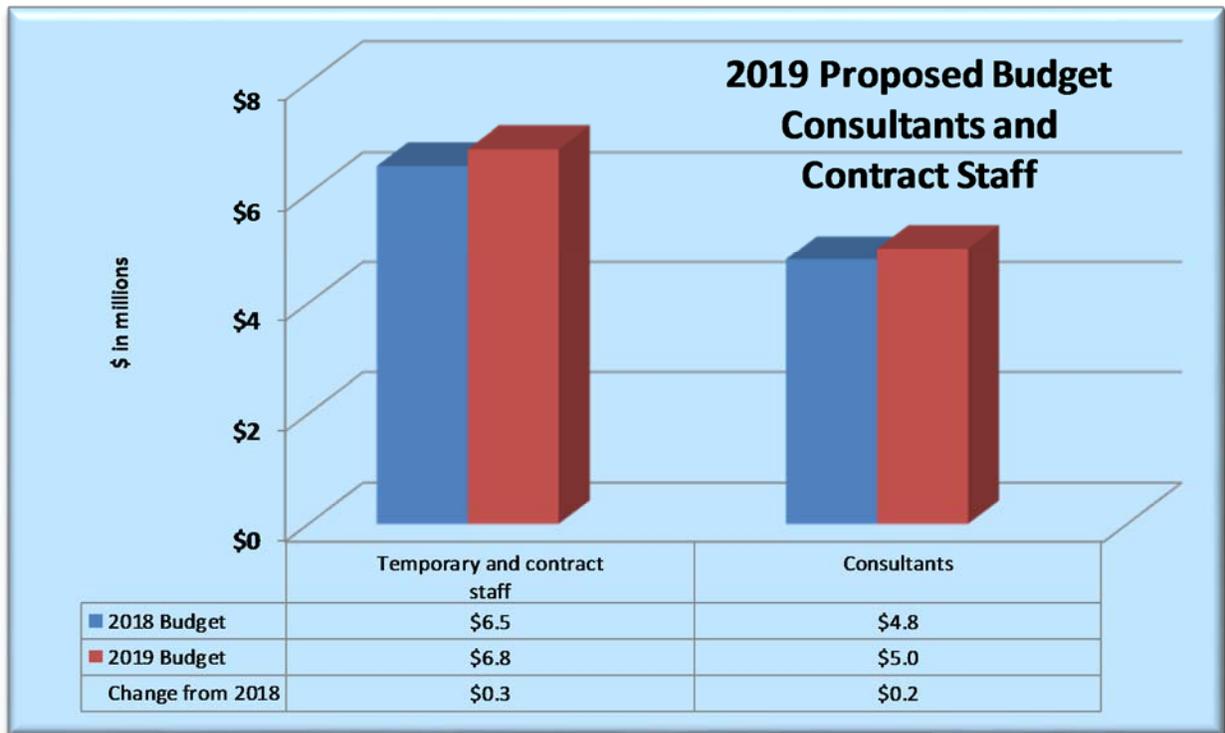


Telecommunication costs increased \$0.3 million, or 7%, to \$4.7 million in 2019 from \$4.4 million in 2018. The increase is primarily due to additional need for telecommunication services to support the varying stakeholder initiatives and internal efforts. These services continue to be managed across all areas of the wired line and wireless services.

Hardware maintenance and software maintenance costs increased by \$0.2 million, or 2% to \$9.8 million in 2019 compared to \$9.6 million in 2018. The increase is primarily due to new systems that provide information for RC functions.

Consultants and Contract Staff

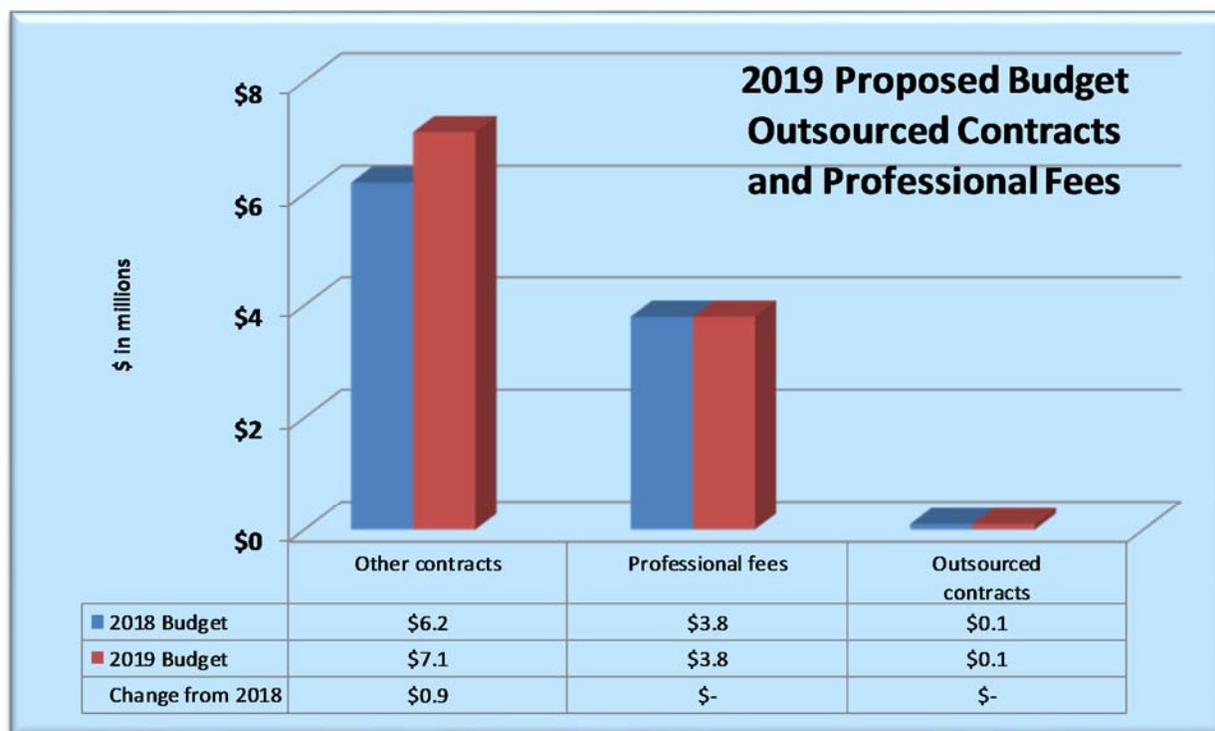
Consulting and contract staff costs increased \$0.5 million, or 4%, to \$11.8 million in 2019 compared to \$11.3 million in 2018. The consulting and contract staff budgets comprise 6% of the 2019 and 2018 budget.



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 Company may bring contractor work in-house when it is of an ongoing nature and lowers overall cost with the same or better service quality. Examples of efforts requiring budget in 2019 include resource adequacy studies, process assessments, training, day-ahead-market studies, and the need for subject matter experts in fields such as renewable integration.

Outsourced Contracts and Professional Fees

Outsourced contracts and professional fees increased \$0.9 million, or 9%, to \$11.0 million in 2019 compared to \$10.1 million in 2018. The budget category comprises 6% of the 2019 and 2018 budgets.



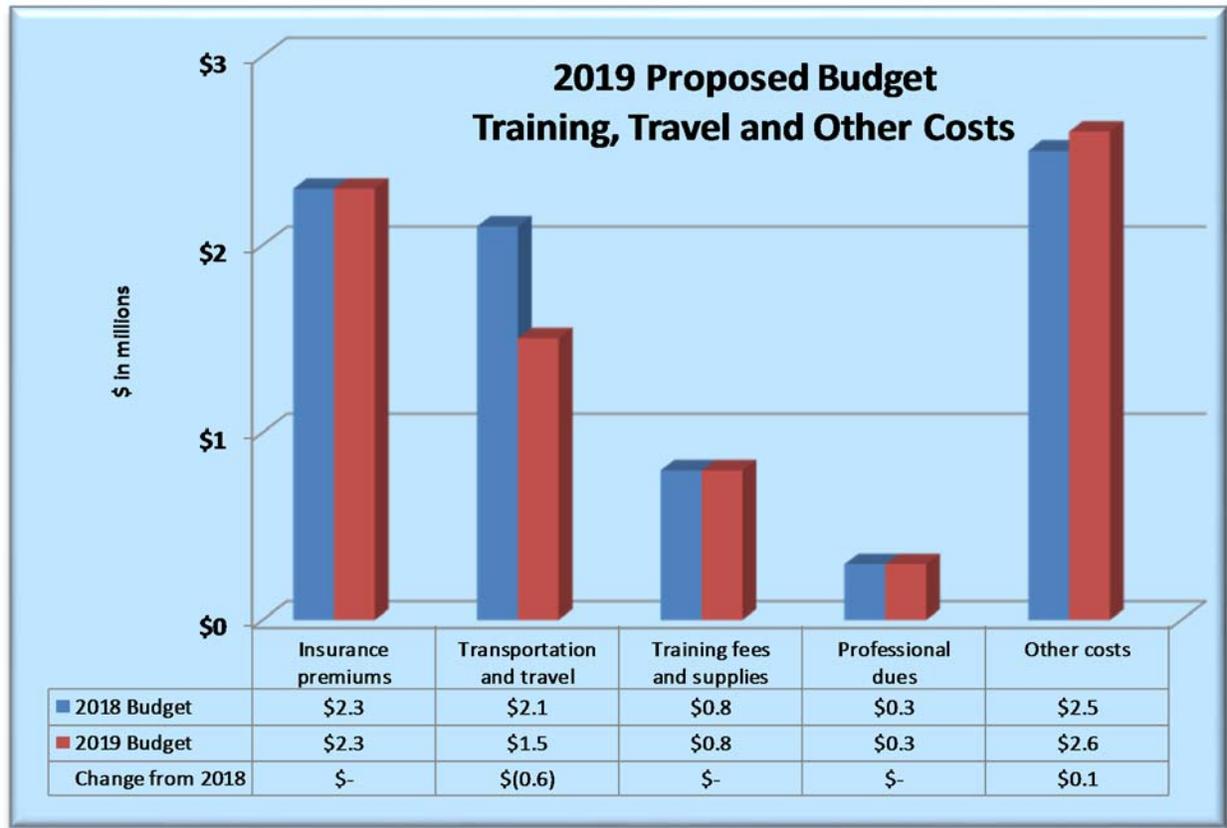
Outsourced and other contracts combined increased \$0.9 million to \$7.2 million in 2019 from \$6.3 million in 2018. The primary driver being the addition of tools needed to support RC functions.

Professional fees remain unchanged at \$3.8 million in 2019.

A large component of the outsourced and 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 \$3.2 million in 2019. 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.

Training, Travel and Other Costs

Training, travel and other costs decreased \$0.5 million, or 6%, to \$7.5 million in 2019 compared to \$8.0 million in 2018. These budgets make up 4% of the 2019 and 2018 budget.



Insurance premiums remain unchanged at \$2.3 million in 2019.

Transportation and travel decreased by \$0.6 million, or 29%, to \$1.5 million in 2019 from \$2.1 million in 2018 due to the corporate initiative to identify savings relating to areas such as conferences and regional meetings. The increased ability to attend meetings remotely has further contributed to this identified reduction.

Training fees and supplies remain unchanged at \$0.8 million in 2019.

Professional dues remains unchanged at \$0.3 million in 2019.

Other costs (primarily bank fees, conference fees, office supplies and Board and stakeholder meeting costs) increased by \$0.1 million, or 4%, to \$2.6 million in 2019 from \$2.5 million in 2018.

Reconciliation of 2019 O&M Budget

The proposed O&M budget increased by \$10.5 million, or 6%, to \$189 million in 2019 compared to \$178.5 million in 2018.

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

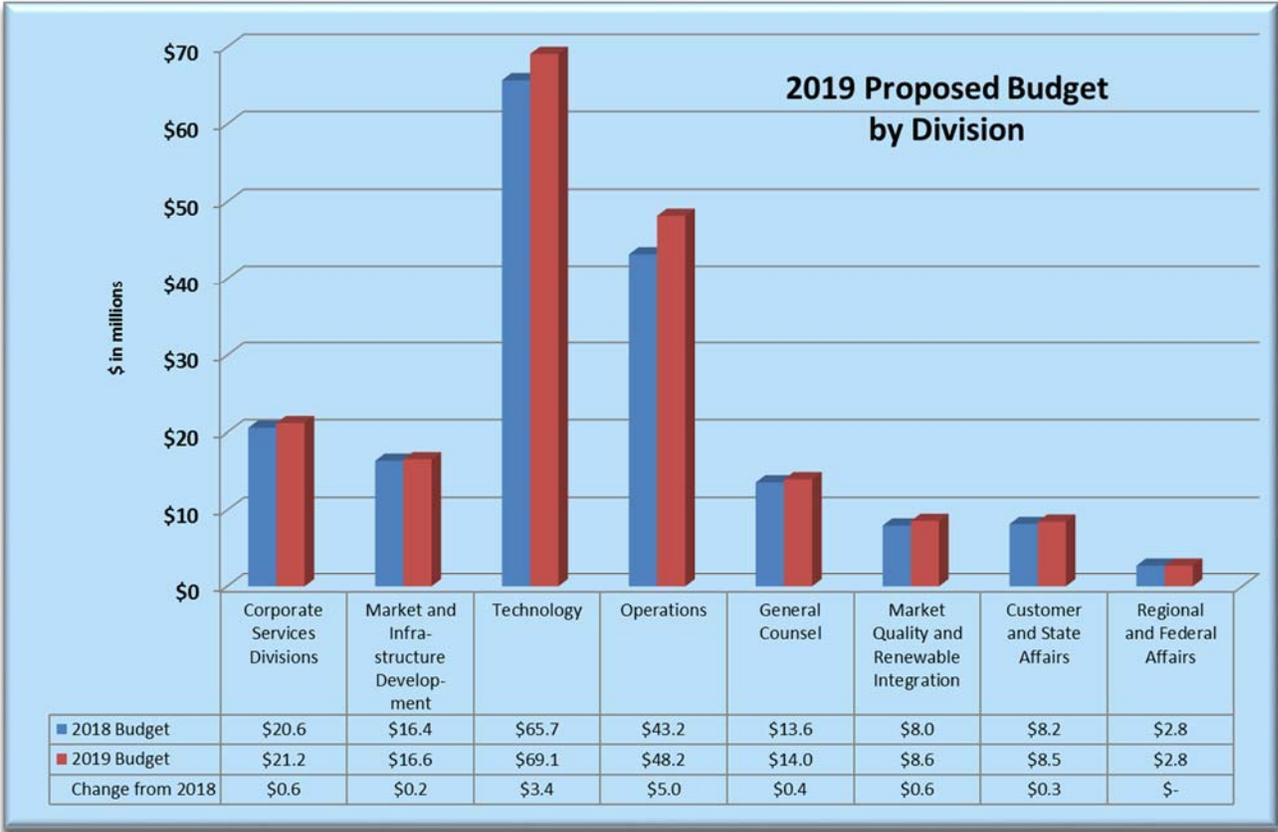
2018 O&M Budget	\$178.5
Increases in the Budget	
Additional headcount, merit, and other compensation increases	9.2
Increase in other contracts and services	0.9
Increase in telecommunications and hardware maintenance	0.5
Increase in consultants	0.3
Increase in temporary staff	0.2
Other	0.1
Total Increases	11.2
Decreases in the Budget	
Reduction in travel, office and other costs	(0.5)
Reduction in equipment	(0.1)
Other	(0.1)
Total Decreases	(0.7)
Net Change in Budget	10.5
Proposed 2019 O&M Budget	\$189.0

V. ISO Divisional Budget Overviews

Each corporate division provides a description of their department, functions, staffing and proposed budget.

The divisions appear in the following order:

- Corporate Services Divisions
 - Chief Executive Officer
 - Human Resources
 - Finance
- Market and Infrastructure Development
- Technology
- Operations
- General Counsel
- Market Quality and Renewable Integration
- Customer and State Affairs
- Regional and Federal Affairs



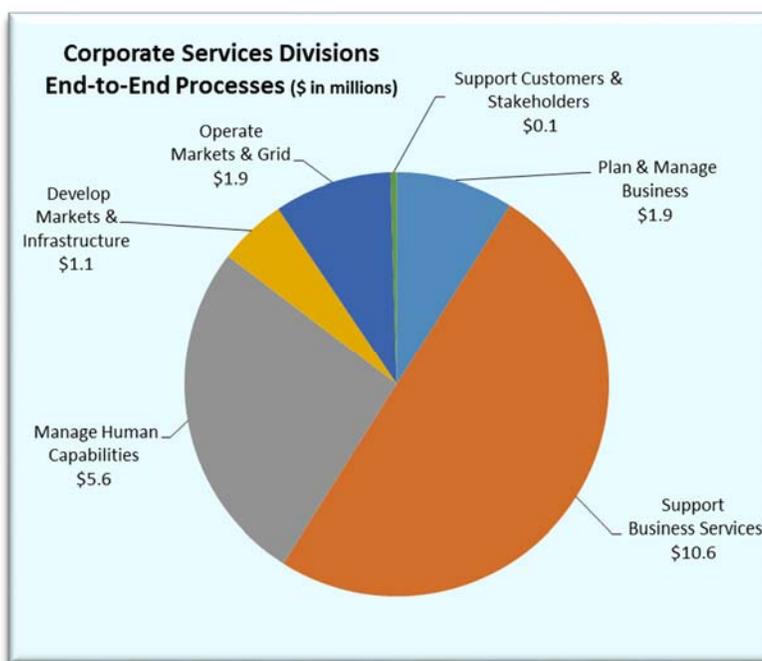
The 2019 budget of \$189 million is \$10.5 million, or 6%, more than the 2018 budget of \$178.5 million. Budgeted staffing has increased to 643 for 2019 from 615 in 2018. The increase in headcount reflects growth associated with offering RC services beginning 2019.

The Technology and Operations divisions account for 37% and 25%, respectively, of the 2019 O&M budget, while the Corporate Services divisions comprise approximately 12%. The Market and Infrastructure Development division accounts for 9% of the 2019 O&M budget, while the General Counsel division accounts for 7%. The Market Quality and Renewable Integration division 5%, the Customer and State Affairs accounts for 4%, and the Regional and Federal Affairs division 1%.

Corporate Services Divisions

The Corporate Services divisions are comprised of the office of the Chief Executive Officer (which includes the Department of Market Monitoring), Finance, and Human Resources divisions.

The **Department of Market Monitoring (DMM)** proactively undertakes sophisticated analysis that informs the ISO in its work 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 are following the rules. The DMM also reviews market results to confirm the activity is producing effective and efficient outcomes.

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

The DMM offers timely input on major market design initiatives, as well products and requirements the ISO is developing 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 Renewable Integration division in noting the challenges associated with excess generation that is occurring as more renewable resources, especially solar, are interconnected to the grid.

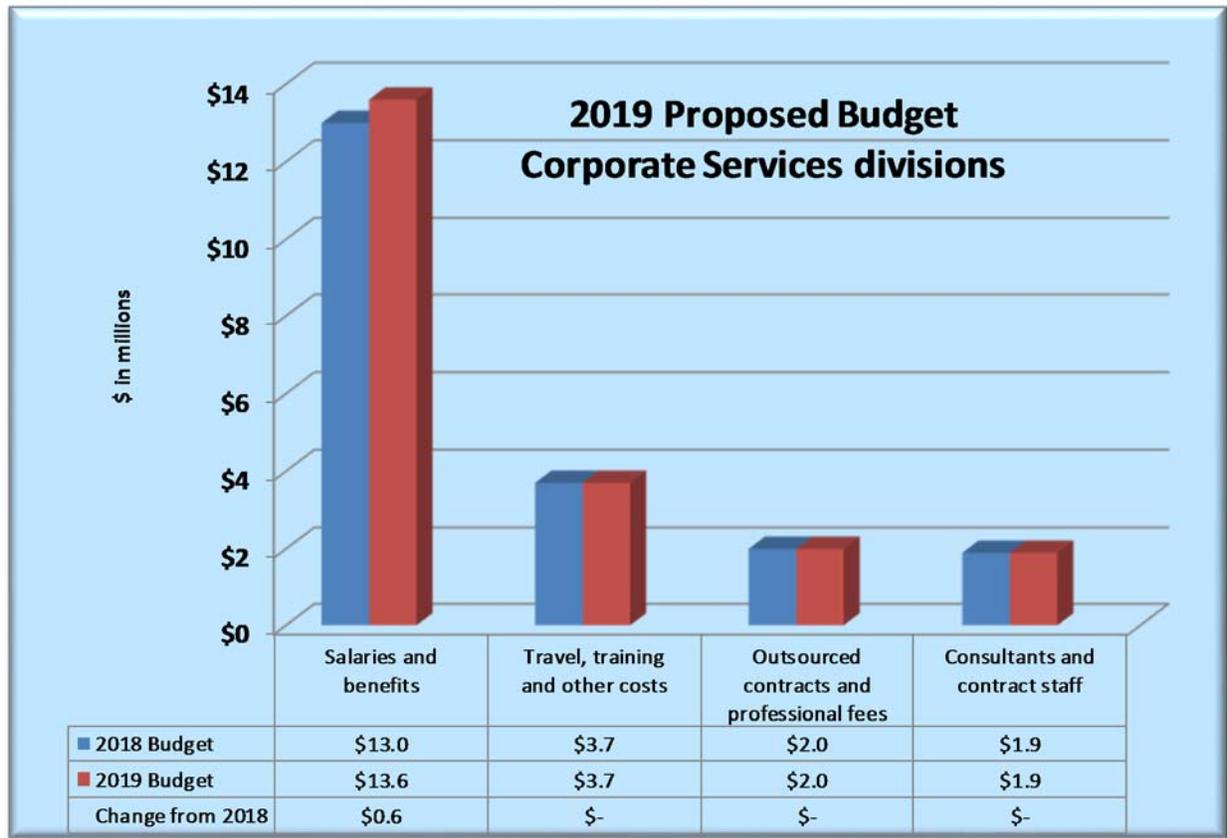
The DMM Oversight Committee of the Board of Governors separately reviews and approves the DMM budget. The budget is then included in the Chief Executive Officer division as before.

The **Finance** division consists of the Chief Financial Officer, treasury, credit, accounting, financial planning and procurement teams. Finance professionals manage ISO 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). Staff also procures goods and services for the corporation by efficiently selecting vendors, negotiating corporate savings, negotiating and managing commercial contracts, and managing costs.

The **Human Resources** division works to attract and retain the uniquely talented professionals needed to reliably operate the electric grid and meet corporate strategic objectives and goals by establishing effective policies, programs and “people” strategies. 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, developing talent pipelines and retaining targeted skills for critical areas.

Discussion of Proposed Budget

The 2019 budget of \$21.2 million increased by \$0.6 million, or 3%, from the 2018 budget. Staffing increased by 2 to 56 compared to 2018.



Personnel costs increased by \$0.6 million primarily due to merit increases and additional headcount.

Training, travel, and other costs remain unchanged for 2019.

Outsourced contracts and professional fees remain unchanged for 2019.

Consultants and contract staff remain unchanged for 2019.

Market and Infrastructure Development Division

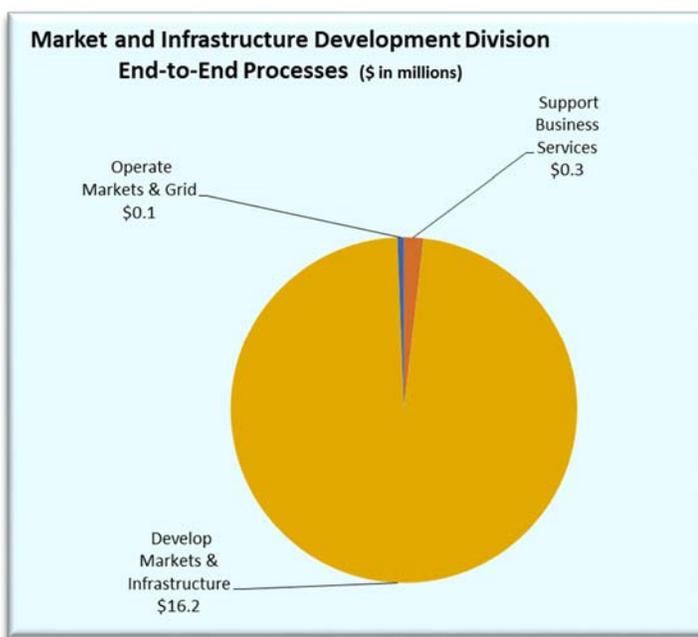
The Market and Infrastructure Development division is a recognized national and international leader in developing wholesale energy market designs that support a flexible grid powered with zero carbon resources. Grid planners use sophisticated modeling and analysis to create a holistic 10-year forward-looking transmission plan each year that not only supports the growth in renewable resources but also maintains and strengthens grid reliability. Division staff also performs studies for resources

seeking to interconnect to the grid. The division takes the lead in developing policies that support a robust market, and promotes timely and efficient infrastructure development. It is responsible for complying with NERC reliability standards and WECC regional criterion applicable to the Planning Coordinator functional entity. It is also responsible for negotiating, executing and tracking compliance with contractual agreements between the ISO and external entities, such as power plant owners and operators.

The division regularly provides advice and in-depth analysis to state regulators on issues related to grid reliability and market efficiency.

A main priority for the division is developing the market mechanisms needed to expand elements of the ISO's day ahead market to balancing areas throughout the West. Such market enhancements can play a critical role in managing and efficiently using renewable resources, and sharing low cost energy across a wide geographic area.

The division's experts spend substantial time and effort in developing the rules and mechanisms to efficiently and reliably integrate renewable resources. This effort includes advancing the ability of distributed energy resources, such as energy storage and electric vehicles, to participate in the wholesale energy market that leverages their multi-faceted operational characteristics to the benefit of the grid and consumers. In addition, the grid planners continually look for ways to enhance transmission planning and generator interconnection processes that support state energy and environmental goals.



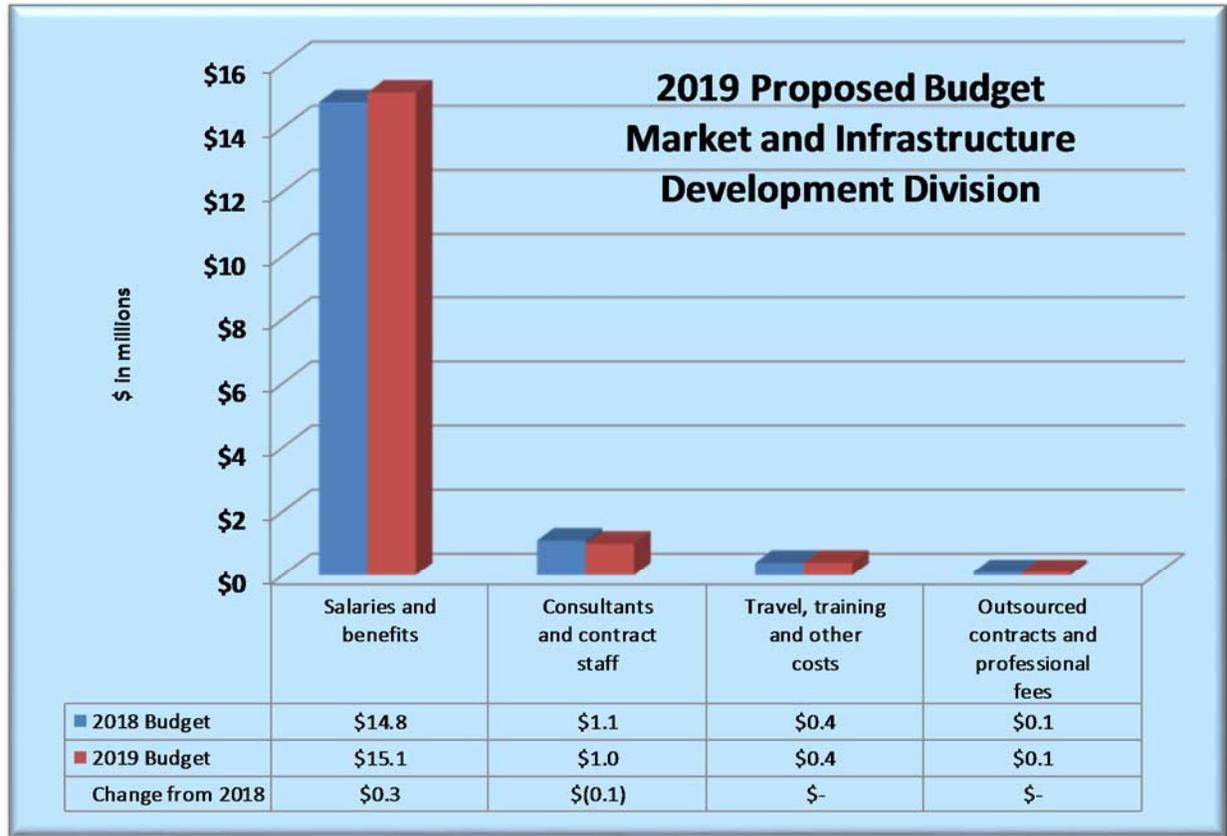
The **Market and Infrastructure Policy** department creates, reviews, and updates ISO policies and rules that support efficient functioning of the energy and ancillary services markets, and the reliable operation of the grid. The department is also refining the Western Energy Imbalance Market processes and rules that promotes an effective and transparent real-time market for EIM participants, which benefits the western U.S. interconnected grid.

The **Infrastructure Development** department conducts transmission planning and resource interconnection studies to ensure the ISO transmission system evolves to meet the changing needs of the grid. This department also manages the resource interconnection study process, a competitive solicitation process for new transmission, and a committee for reviewing transmission maintenance practices among the ISO participating transmission owners.

The **Infrastructure Contracts and Management** department develops and manages the contracts that support the efficient functioning of ISO markets. This includes generator interconnections and contracts related to the reliable grid operations driven by state and federal policies, and technological advances. Ongoing duties include developing policy positions on regulatory issues and responsibility for over 2,700 ISO regulatory contracts, including their negotiation, drafting and administration.

Discussion of Proposed Budget

The 2019 budget of \$16.6 million is \$0.2 million, or 1%, greater than the 2018 budget of \$16.4 million. Staffing remains unchanged at 67 for 2019.



Salaries and benefit expenses increased by \$0.3 million due to merit increases.

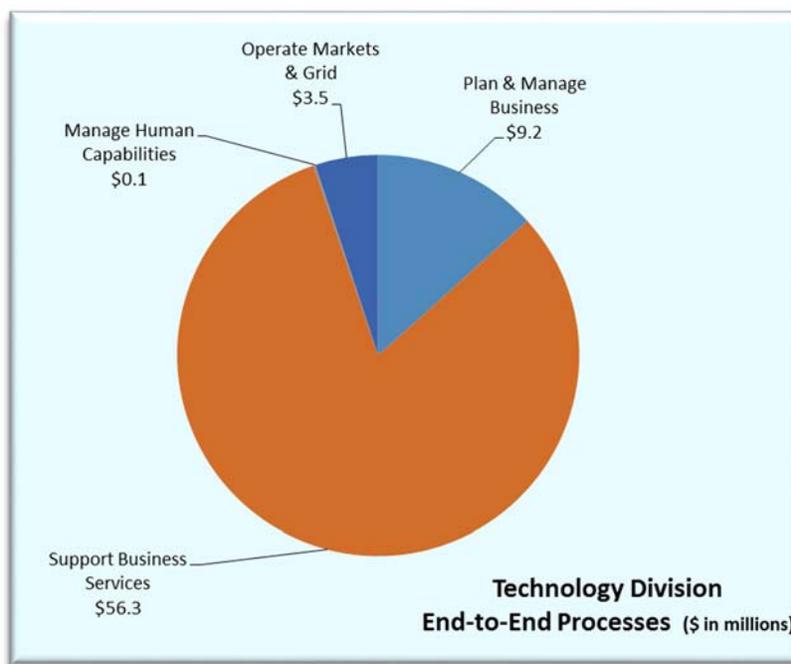
Consulting and contract staff costs decreased by \$0.1 million to \$1.0 million primarily due to efficiencies within the transmission competitive solicitation process and contract conversion staffing.

Travel, training, and other costs remain unchanged at \$0.4 million in 2019.

Outsourced contracts and professional fees remain unchanged at \$0.1 million.

Technology Division

The Technology division encompasses information technology (IT), power systems technology, campus operations, software quality, IT architecture, information security and program management functions. The division strives to enhance corporate intra-system performance and implement new functionalities to support ISO goals and objectives by providing cost efficient and exceptional service.



The division's 2019 priorities are as follows:

- implement strategic initiatives by making appropriate process, procedure and system changes;
- make incremental technology improvements, especially for market and reliability operations;
- proactively identify and fix system problems; and
- predict and proactively strengthen system vulnerabilities.

The Technology division maintains the foundation in which the ISO's transparent and robust wholesale energy market and transmission system relies upon to integrate renewable resources. The division is also developing a scalable IT infrastructure that will support an expanded day-ahead market and provide grid optimization to utilities throughout the West.

The division is well into its mid- and long-term plans in making network architectural changes so that ISO systems are easier to maintain, reduce maintenance costs and leverage technologies to improve cost effectiveness.

The **Program Management Office** systematically serves corporate strategy through project and process excellence. It leads, manages, and analyzes major initiatives and projects that enhance customer service and processes. The department's primary functions include release planning, program management, and business and system analysis for the Strategic Plan and the market initiatives roadmap. The Program Management Office

follows proven, reliable processes to provide quality services, which are based upon Project Management Institute and Capability Maturity Model Integration standards.

The **Power Systems and Smart Grid Technology Development** department identifies emerging technologies that could benefit ISO operations, even while 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 as well as to get ahead of issues that could threaten grid reliability. The department 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.

The **Power System Technology Operations** department 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 department works side-by-side with Operations while making sure all network releases, patching, and upgrade enhancements transition to production without disrupting grid operations.

The **Infrastructure Engineering and Network Operations** department includes systems engineering and administration, database engineering and storage administration, network and data center operations including 24/7 support of pre-market, market and post market applications as well as change, problem, and asset management. The team also manages redundant data and voice communications across multiple sites including associated hardware and software capital budgets.

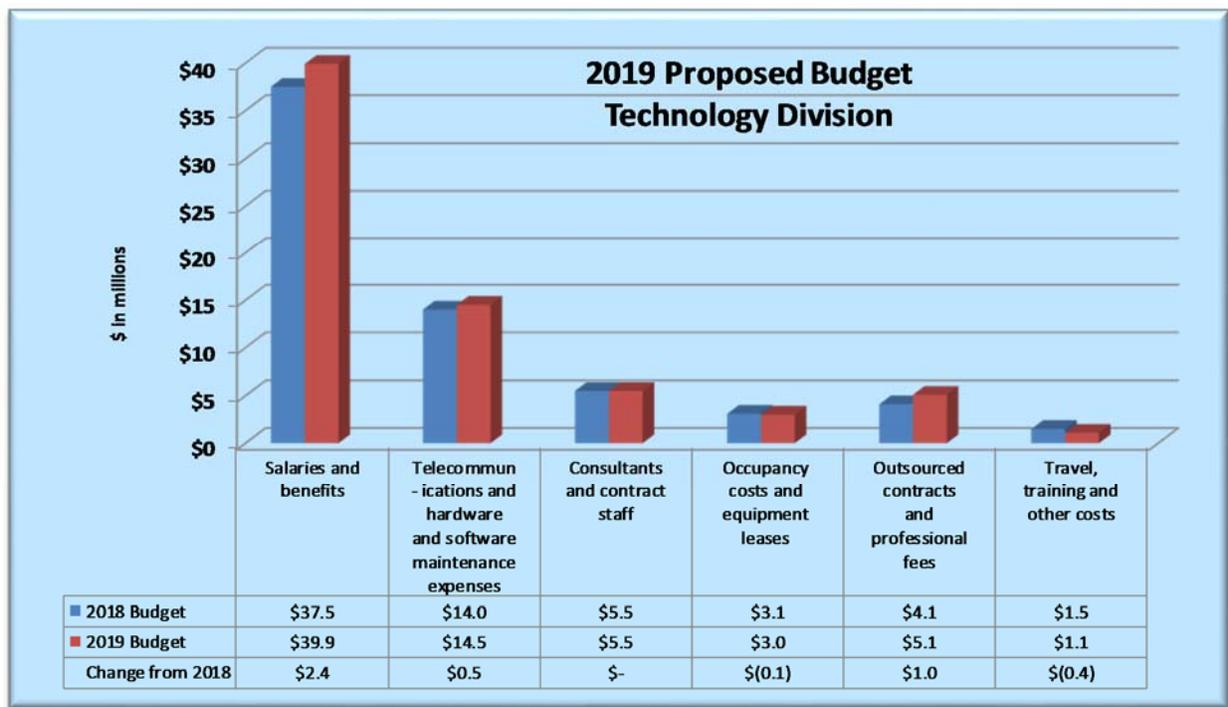
The **Security, Architecture and Model Management and Quality** department helps create the tools to maintain the enterprise network model. The team also tracks and suggests controls to safeguard corporate information security. The department oversees Critical Infrastructure Protection compliance, while other duties include executing security, performance and test automation, and ensuring overall software quality. The department also defines information technology architecture guidelines.

The **Business Solutions** department identifies software solutions and readies 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 as well as for 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. In 2019, the Business Solutions department will contribute to most of the effort on the ISO capital project list.

The **IT Enterprise Support and Campus Operations** department manages the service desk, desk side support of client systems, email, and support of all Windows servers. The group also includes Campus Operations that oversee company buildings and infrastructure with goals of providing a safe, efficient and comfortable work environment. Expert building managers maintain the ISO's 277,000 square foot Folsom headquarters that sits on 27 acres, as well as the 35,833 sq. ft. backup facility in Lincoln, and keep costs down by developing best practices. The team is responsible for physical security at both of the ISO campuses. Additionally, the team includes Incident Command and Business Continuity that helps ensure the ISO is ready to manage grid events and support normal business operations.

Discussion of Proposed Budget

The 2019 budget of \$69.1 million is \$3.4 million, or 5%, greater than the 2018 budget of \$65.7 million. Staffing increased by 7 to 202 compared to 2018 to address growth associated with the rollout of RC services.



Salaries and benefit expenses increased \$2.4 million, due to merit increases and additional headcount.

Telecommunication costs increased \$0.3 million to \$4.7 million in 2019 from \$4.4 million in 2018. The increase is primarily due to new systems that provide information for RC services. The telecommunication change is accompanied by a net increase between

hardware and software maintenance costs of \$0.2 million to \$9.9 million in 2019 from \$9.7 million in 2018. The increase is primarily due to additional need for telecommunication services as RC services roll out. The ISO continues efforts to control hardware and software maintenance growth and make improvements where available.

Consulting and contract staff costs remain unchanged at \$5.5 million.

Occupancy costs and equipment leases decreased by \$0.1 million to \$3.0 million in 2019 from \$3.1 million in 2018 due to facility operating efficiency improvements.

Outsourced contracts and professional fees increased \$1.0 million to \$5.1 million in 2019 from \$4.1 million in 2018 primarily due to the addition of the tools needed to support RC functions.

Travel, training, and other costs decreased by \$0.4 million to \$1.1 million in 2019 from \$1.5 million in 2018 due to an initiative to identify savings relating to areas such as conferences and regional meetings and to better align budget with current spend levels.

Operations Division

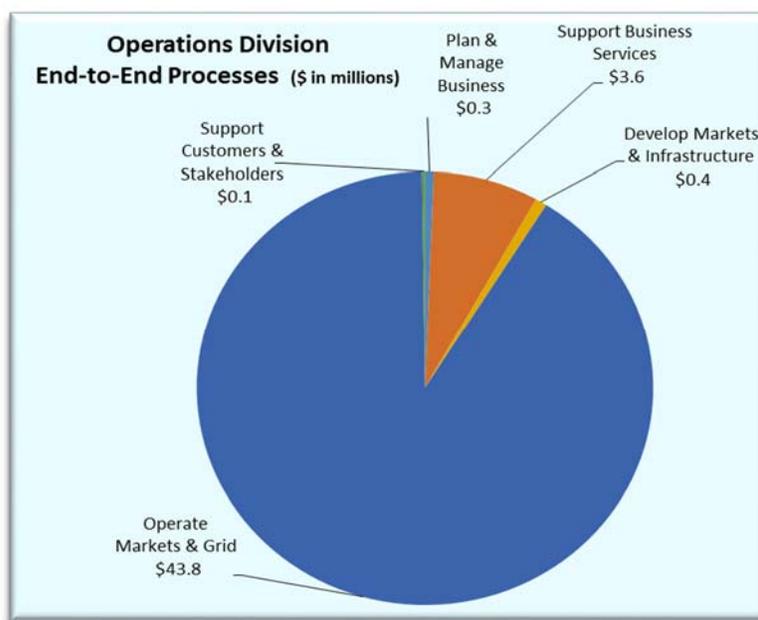
The Operations division mission is operating the bulk electric system and wholesale electricity markets with a high degree of reliability. It is comprised of System Operations, Operations Engineering Services, Regional Operations Policy and Analytics, Market Services Support, and Market Services Production departments.

Operating engineers use advanced technology tools to proactively manage the dynamic minute-by-minute changes experienced on the grid system. The ISO control center uses geospatial technology and advanced visualization capabilities that provides system operators with a granular view of grid conditions. This in turn means engineers can quickly identify potential grid and generation fleet problems with a goal of solving them before they affect the real-time delivery of power. The Systems 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 skilled professionals in the Systems Operations and Operations Engineering Services departments use advanced technologies and tools to reliably operate the grid and support efficient markets while contributing to the evolution to a modern, flexible grid that reflects state policy goals.

The **System Operations** department comprises the Real-Time Operations and the Operational Readiness groups. The Real-Time Operations group is composed of interchange, transmission, generation, and market system operators who oversee electricity production schedules and power deliveries, as well as having the authority to manage the generation fleet and transmission lines to maintain reliability.

The Operational Readiness group implements the operational aspects of ISO policy and operational goals, as well as providing system operators with the tools and training necessary 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 Engineering Services** department directly supports System Operations 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, day-ahead and real-time engineering analysis. The department also provides input in developing operating procedures and tools.

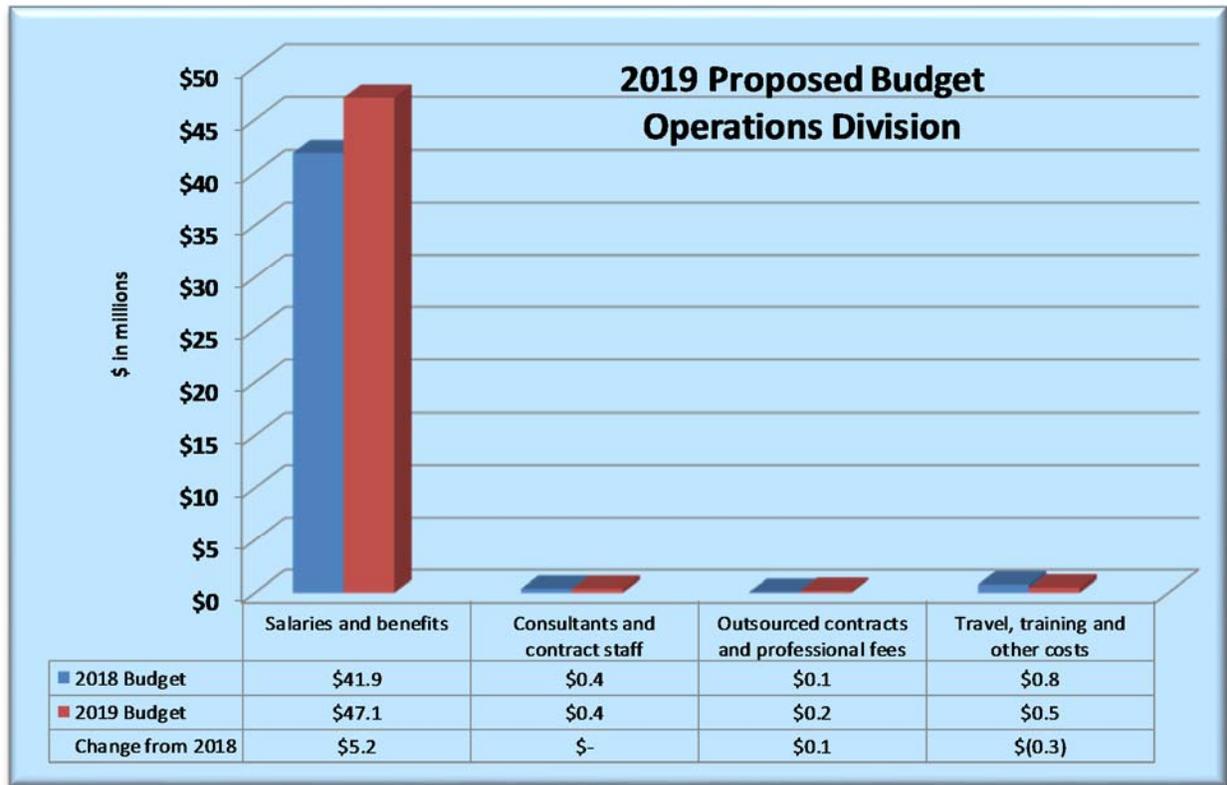
The **Regional Operations Policy and Analytics** department works with state, regional and national entities to balance policy direction with operational capabilities. This department is also the ISO liaison for coordinating gas and electric policies with state agencies and stakeholders, and represents 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.

The **Market Services Support** department is responsible for implementing market software and technology enhancements that produce transparent, consistent and efficient operations and settlements. The team manages the Congestion Revenue Rights program, including model development, executing the monthly and annual auctions, and reporting on results. Other responsibilities include resolving settlement disputes and the processing and reporting of price corrections. Additionally, the team administers the Rules of Conduct program, which includes providing oversight of certain market participant behaviors.

The **Market Services Production** department works with new ISO participants in arranging for the exchange of data used in the ISO network and market models. In addition, the department supports existing participants in revising parameters for all related resources used in the markets. Department staff helps directly coordinate the required information exchange between ISO participants and internal supporting departments, allowing defined weekly model scoping, verified accuracy of real-time telemetry and revenue metering, and coordinated resource interconnections. This department is also responsible for communicating with the ISO participants to produce daily settlement statements while meeting the tariff defined settlement timeline. This task is accomplished through daily system processing, data validations, corrections updating, and maintaining the weekly billing invoice publication cycle.

Discussion of Proposed Budget

The 2019 budget of \$47.1 million is \$5.2 million, or 12%, greater than the 2018 budget of \$43.1 million. Staffing increased by 18 to 217 compared to 2018 to address growth associated with the rollout of RC services.



Salaries and benefit costs increased \$5.2 million to \$42.9 million primarily due to the growth associated with the rollout of RC services.

Consulting and contract staff costs remain unchanged at \$0.4 million in 2019.

Outsourced contracts and professional fees increased by \$0.1 million to \$0.2 million in 2019 accounting for the transfer of budget for an Operations specific data subscription service from another division. This change is a net zero at the corporate level.

Travel, training and other costs decreased by \$0.3 million to \$0.5 million in 2019 related to an initiative to identify savings in areas such as conferences and to better align budget with current spend levels.

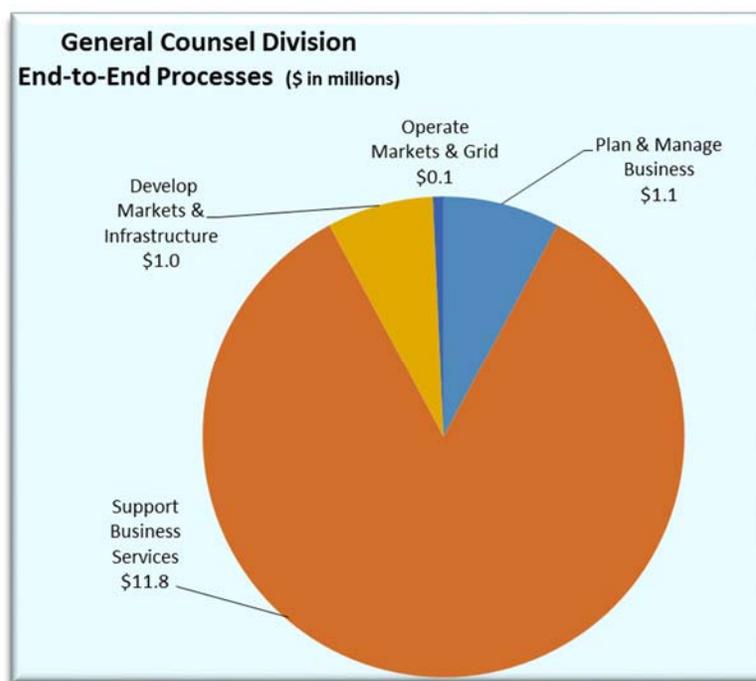
General Counsel Division

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 counsel to the Board of Governors, the CEO, the executive team, and 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; 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.

Compliance and Corporate Affairs oversees the company's compliance responsibilities, and promotes a corporate culture of compliance in support of applicable laws, regulations and corporate policies. It provides reasonable assurance to executive management and the Board that there are effective and efficient policies and procedures in place, which are well understood and adhered to by ISO personnel, and that the company is maintaining compliance with the tariff and other legal and regulatory requirements governing the ISO. Compliance 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 in an effort to minimize the risk of non-compliance. This team also develops and implements the corporate records management program in accordance with legal and regulatory requirements. Compliance and corporate affairs has various enterprise-wide responsibilities, including strategic plan development and formation of corporate annual and long-term goals and metrics.

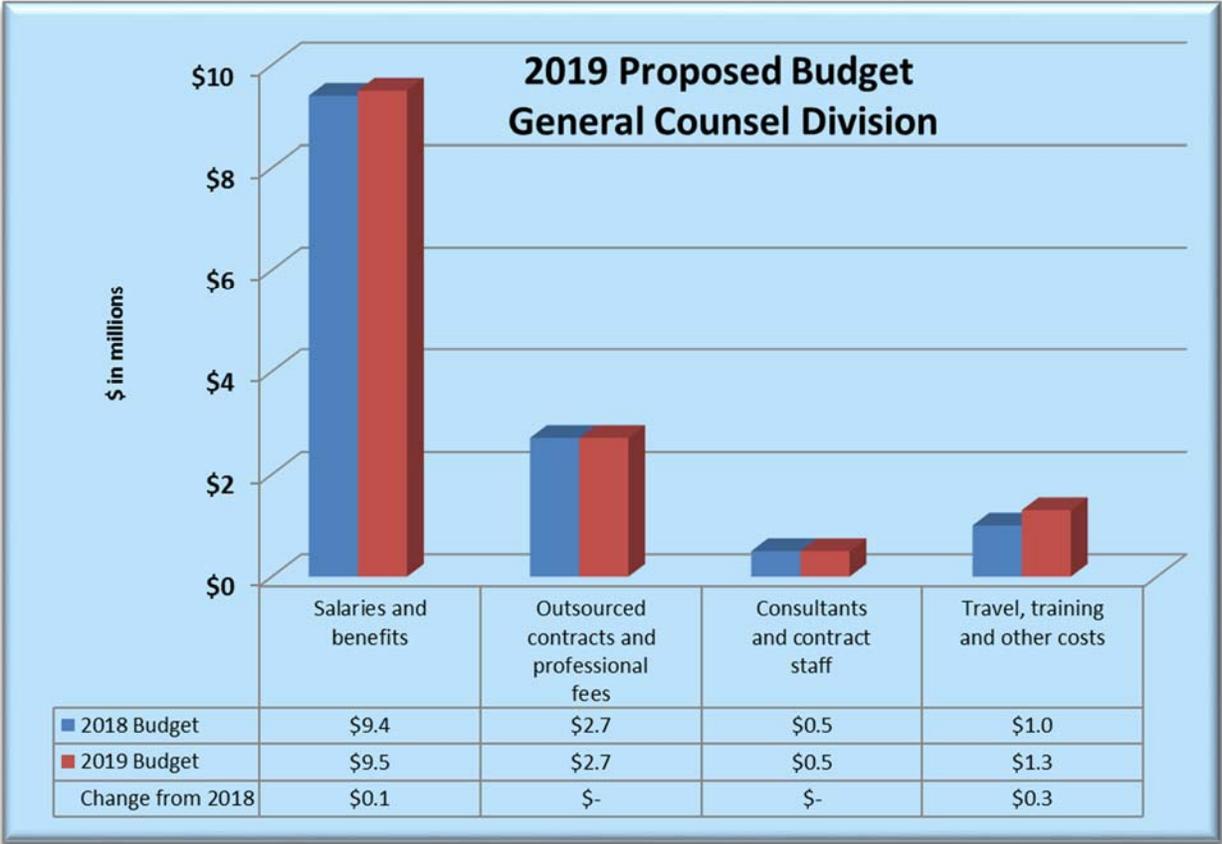


Internal Audit develops the annual internal audit plan and conducts audits to evaluate the effectiveness of management practices and controls. The team provides executive management and the Audit Committee with reasonable assurance regarding whether processes and controls are functioning as intended and risks are well managed. Internal Audit also facilitates the ISO enterprise risk activities, including briefing executive management and the Board 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.

Discussion of Proposed Budget

The 2019 budget of \$13.9 million is \$0.4 million, or 3%, greater than the 2018 budget of \$13.5 million. Staffing remains at 34 for 2019.



Salaries and benefit costs increased by \$0.1 million to \$9.5 million in 2019 primarily due to merit increases.

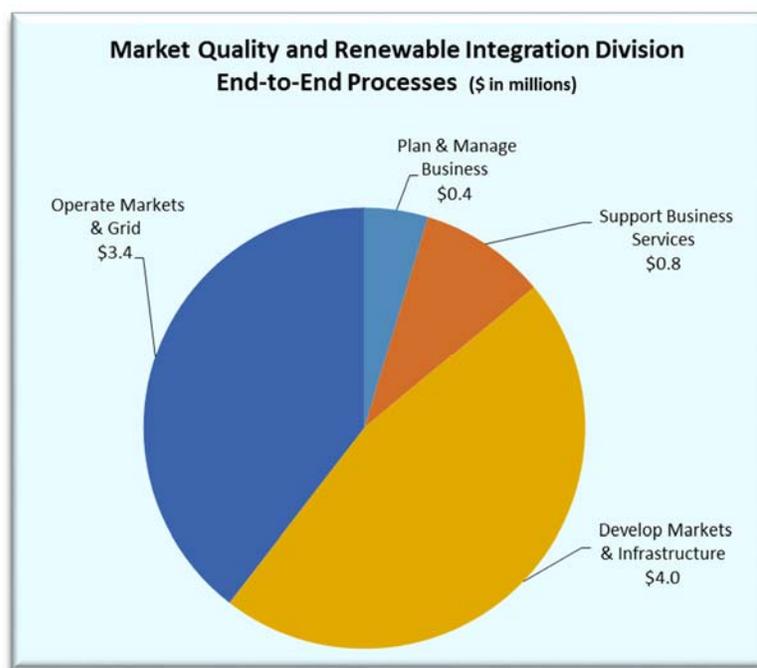
Professional fees remain unchanged at \$2.7 million.

Consultants and contract staff remain unchanged at \$0.5 million.

Travel, training and other costs increased by \$0.3 million to \$1.3 million in 2019 due to changes in the board compensation structure.

Market Quality and Renewable Integration Division

The Market Quality and Renewable Integration division tracks and reports market performance metrics, and performs price analysis and validation that enhances transparency and confidence in market results. The division performs short-term load, wind and solar forecasting and is responsible for assessing system flexibility that supports integrating renewable resources. The division also performs assessments and quantifies benefits related to the Western Energy Imbalance Market.



In addition to performing in-depth market analysis, the division uses advanced short-term demand and supply forecasting technologies to ensure grid needs are being met through the competitive wholesale energy market. Also, the division conducts generation fleet studies that test whether adequate “flexible capacity” is installed to meet future electricity growth. The division’s focus for 2019 is to enhance the consistency of modeled conditions between the day-ahead and real-time market, which increases market efficiency.

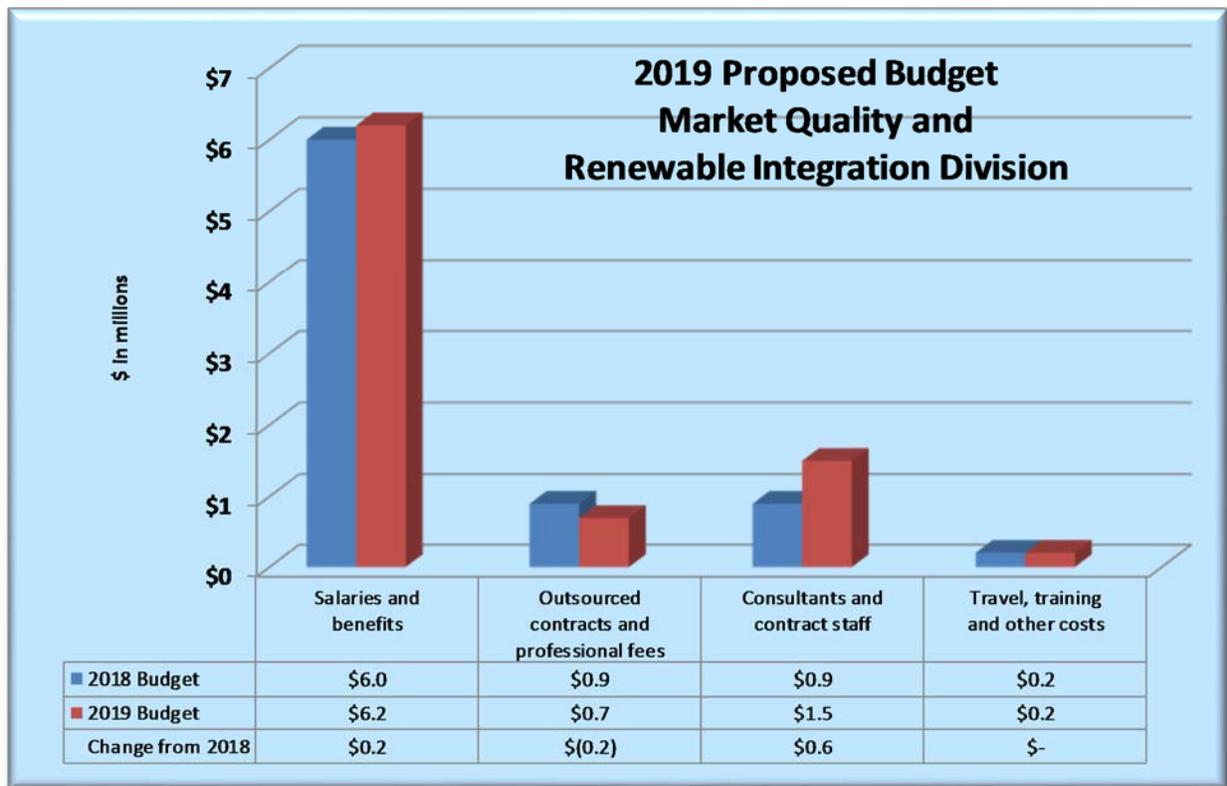
The **Market Development and Analysis** department monitors the market, identifies systemic issues, and then develops solutions to rectify them. The department is also responsible for supporting policy development and implementing new market designs. Department experts co-hosts the Market Performance and Planning Forum web conference, which provides updates and observations on current market performance to stakeholders with an emphasis on coordinating plans with them to implement market enhancements, services and features.

The **Market Validation and Quality Analysis** department monitors, analyzes and validates the quality of daily market results. The department is also responsible for price corrections as well as identifying and addressing root causes of erroneous prices and other market quality issues.

The **Short Term Forecasting** department produces accurate short-term forecasts for load and variable energy resources such as wind and solar generation.

Discussion of Proposed Budget

The 2019 budget of \$8.6 million is \$0.6 million, or 7%, greater than the 2018 budget of \$8.0 million. Staffing remains at 27 for 2019.



Personnel costs increased in 2019 by \$0.2 million to \$6.2 million primarily due to merit increases.

Outsourced contracts and professional fees decreased \$0.2 million to \$0.7 million in 2019 primarily due to the shift of a data subscription service to the Operations division.

Consultants and contract staff increased by \$0.6 million to \$1.5 million in 2019 due to increased need for Enhanced Day Ahead Market (EDAM) studies.

Travel, training and other costs remain unchanged in 2019 at \$0.2 million.

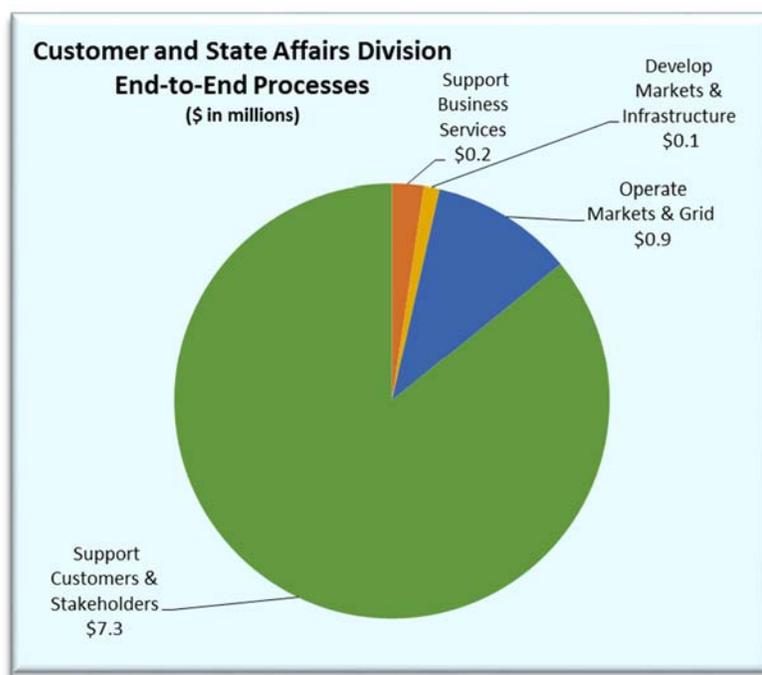
Customer and State Affairs Division

The Customer and State Affairs division builds collaborative relationships with regulators, state officials, environmental and consumer groups, as well as industry stakeholders and international delegations. The division works to foster superior customer service by providing timely and accurate information. This includes working closely with other ISO business units to proactively and promptly resolve market participant issues. One of the division's highest priorities is

maintaining open and robust communications with market participants, regulators, state officials and other stakeholders. This includes creating fact sheets and infographics that translate technical engineering and market design terms and concepts into language that non-technical audiences can understand and use. In addition, the division coordinates and consults with state agencies, the governor's office to help shape and enhance environmental and grid reliability policies.

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

The **Customer Service and Stakeholder Affairs** department is the primary business contact between the ISO and its clients, as well as stakeholders. The department offers bid-to-bill support services for 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.

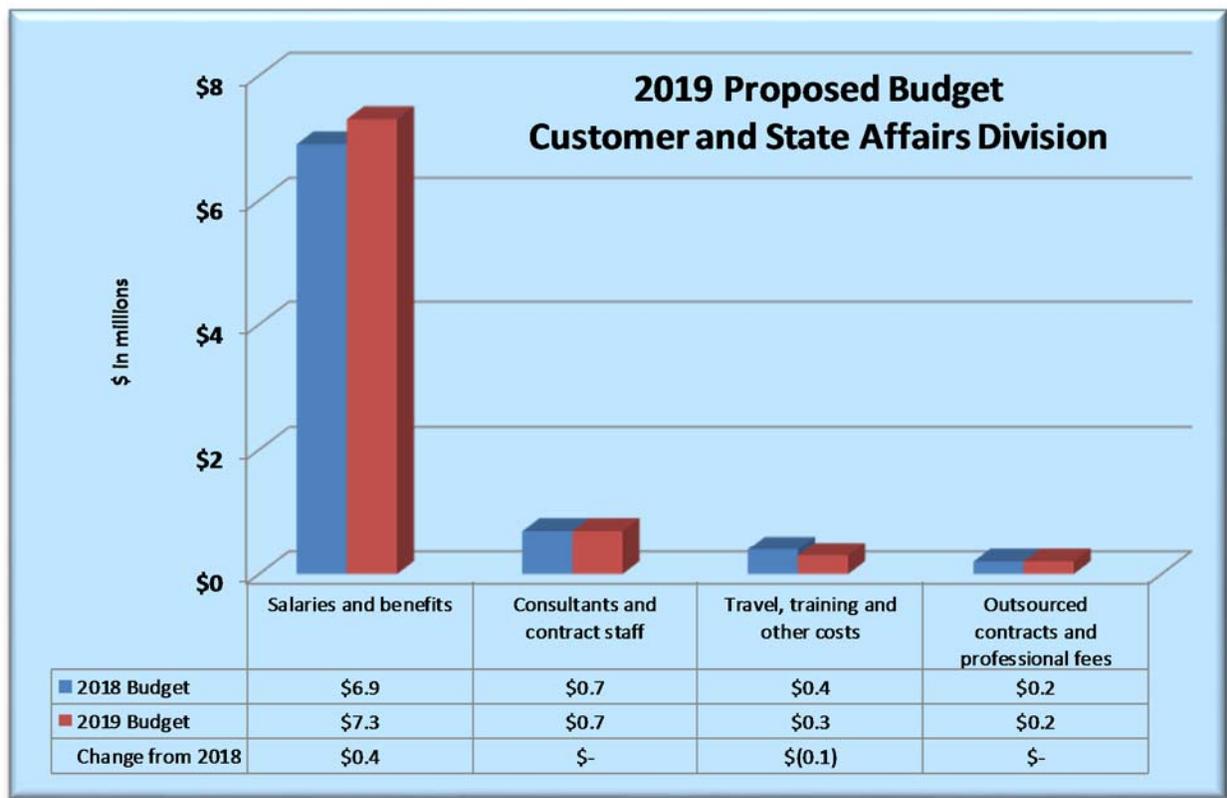


The **State Affairs** department develops and maintains interactions with state lawmakers, the Governor’s office, business associations, environmental organizations and international delegations to enhance their understanding of both grid operation and matters that could affect the reliability or economics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

The **State Regulatory Affairs** department 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.

Discussion of Proposed Budget

The 2019 budget of \$8.5 million is \$0.3 million, or 4%, greater than the 2018 budget of \$8.2 million. Staffing increased by 1 to 35 compared to 2018.



Salaries and benefit costs increased by \$0.4 million to \$7.3 million primarily due to merit increases and headcount change.

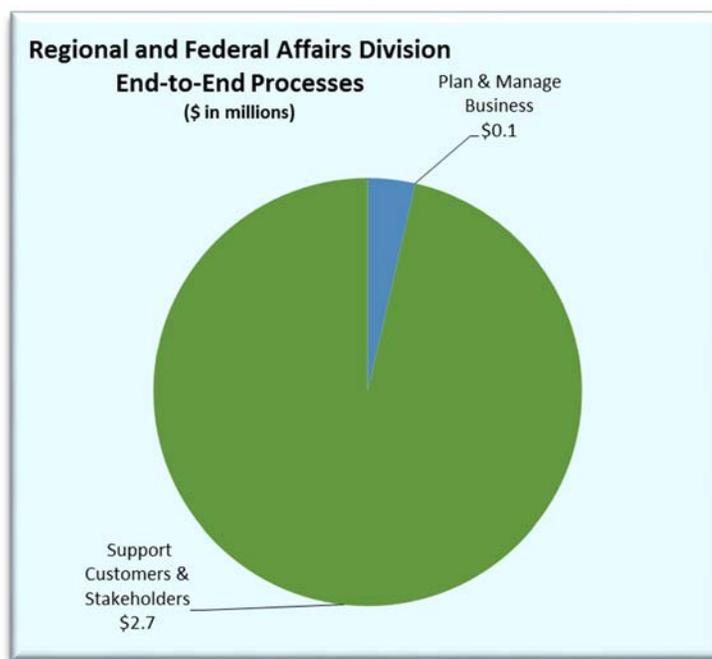
Travel, training and other costs decreased by \$0.1 million to \$0.3 million in 2019.

The budget for the other resource categories remains the same in 2019.

Regional and Federal Affairs Division

This division engages stakeholders, regulators, consumer groups and elected officials on governance and policy strategies that support activities such as coordinating ISO's performance of the RC function, furthering participation in Energy Imbalance Market (EIM) and establishing a regional ISO market. Through consistent cooperation with regional entities such as the Western Interstate Energy Board, Western Conference of Public Services Commissioners, state agencies

and industry groups, division staff disseminate information on ISO related matters to the western footprint, allowing stakeholder participation and insight into market functions where no previous experience exists. The team presents complex engineering and power market analysis in an easy to understand format that can be used by decision makers in their deliberations, and to gain support from the public at large. At its core, this division's mission is to facilitate deeper collaboration with all of the ISO's regional customers, stakeholders and neighboring balancing authority areas.



The **Regional Affairs** department builds, develops, and strengthens ISO relationships with western state government agencies, industry associations, and interested stakeholders. To ensure a regional voice on regional related matters, such as EIM, is heard, this department facilitates consistent and robust coordination between the EIM Governing Body, Regional Issues Forum, Body of State Regulators, and stakeholders across the region. Staff provides support that results in effective meetings, the exchange of valuable dialogue and the advancement of ISO goals. The work of this department reflects the shift to more coordinated power markets in the West, as consumers benefit from the lower costs, more reliable grid, and cleaner environment that results from improved regional collaboration.

The **Strategic Alliances** department promotes regional coordination and cooperation across the West, which includes expanding the Western Energy Imbalance Market. This real-time market reduces energy production and delivery costs for participants by more efficiently using a large pool of generation resources to serve demand. Strategic Alliances assists a variety of entities seeking some sort of participation with the ISO. The department

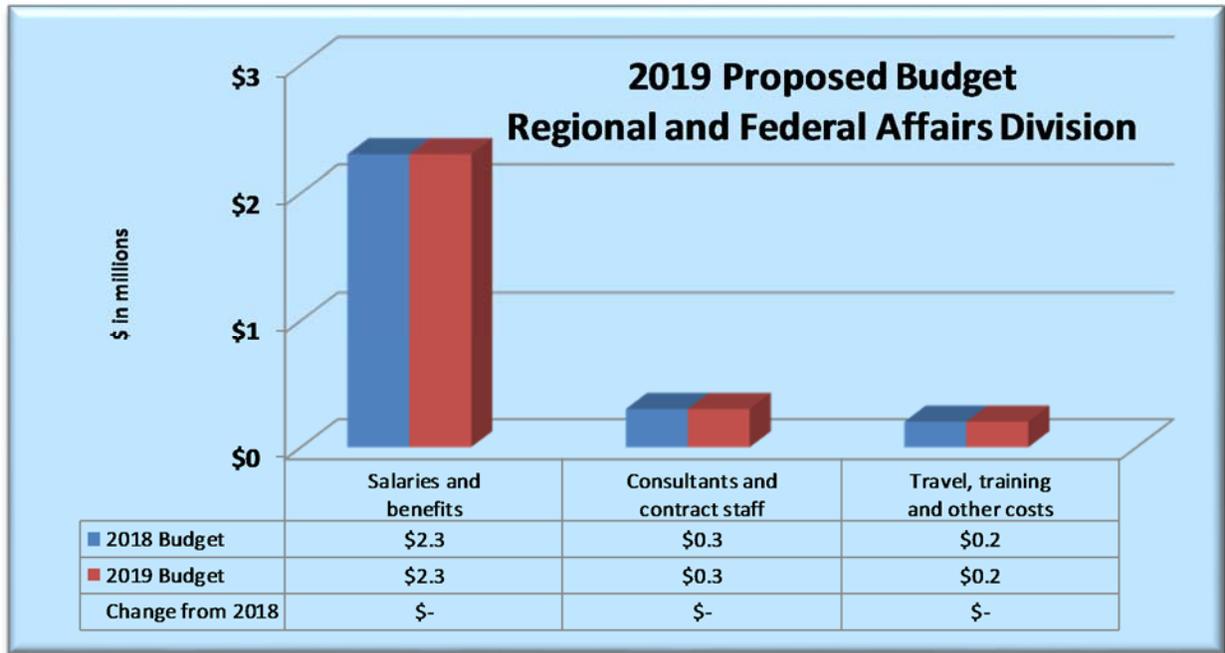
collaborates closely with other internal divisions to provide clear and professional coordination with regional utilities by supporting cost/benefits analysis, regulatory filings and other activities necessary to support participation in our markets. In addition, this department provides education and outreach to entities such as neighboring balancing authorities, third party transmission customers, and a variety of other stakeholders on matters of importance to them.

The **Regional Integration** department supports transmission owners' interest in becoming a full ISO participating member and facilitates outreach with entities interested in taking Reliability Coordination services from the ISO. This department acts as the primary liaison between new participants and internal ISO business units to enable smooth market entry, facilitating any needed discussions, studies or changes to the ISO tariff and procedures. The department works closely with ISO executives and management to develop strategies for successful integration of new market participants in the EIM and for the RC function. In addition, department staff provides the expertise to support interactions between the ISO and regional policymakers on a variety of market issues.

The **Federal Affairs** department monitors and manages federal legislative and regulatory matters that could influence ISO practices and policies. It works with members of Congress, federal agency personnel and stakeholders to advise and educate lawmakers on policies that could affect the power system and that support the ISO's corporate objectives.

Discussion of Proposed Budget

The 2019 budget of \$2.8 million remains unchanged from 2018. Staffing remains unchanged at 7.



Salaries and benefit costs increased marginally due to merit increases.

The budget for the other resource categories remain the same in 2019.

VI. Debt Service

The debt service amount included in the 2019 GMC revenue requirement remains unchanged from 2018. At \$16.9 million, 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 semiannual interest payment due in August of the budget year, the principal and semiannual interest payment due in February of the ensuing year and the 25% debt service reserve amount required by the tariff.

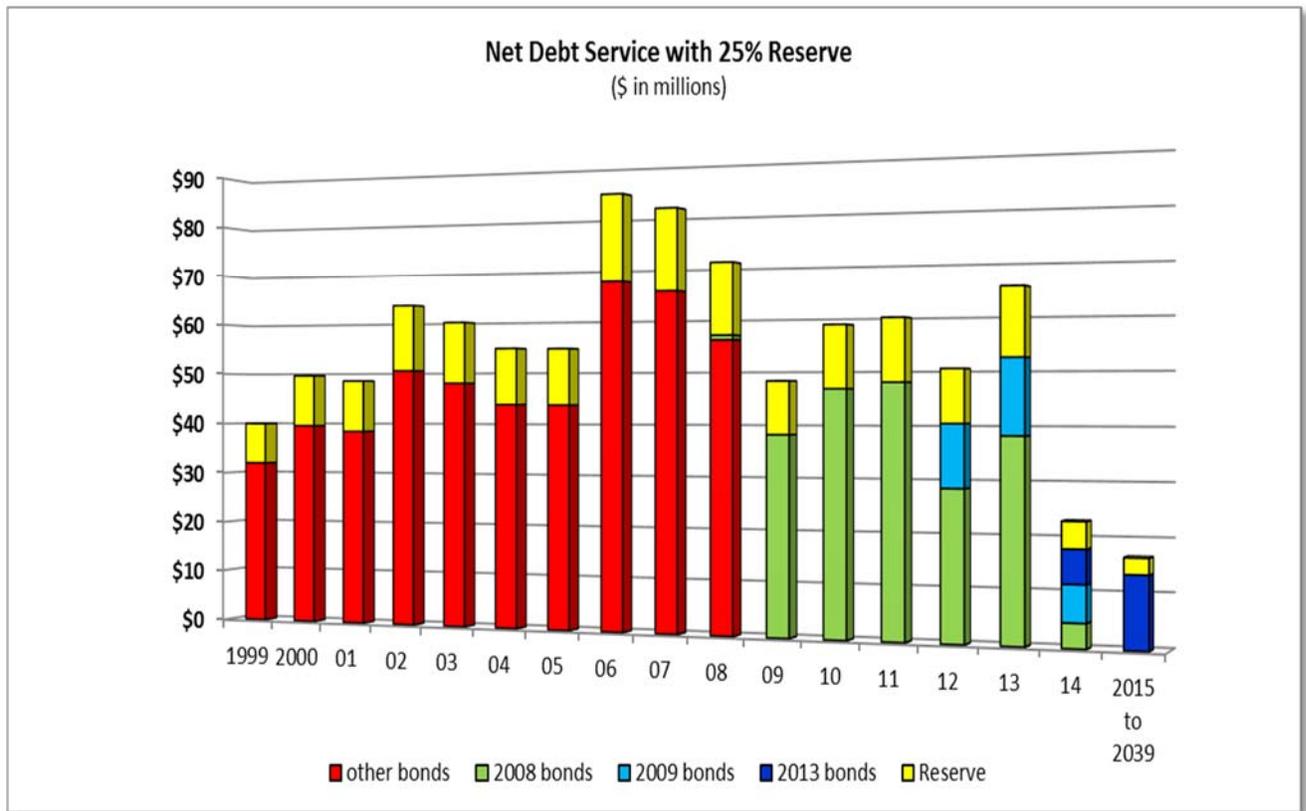
A summary of the debt service components for 2019 and 2018 included in the GMC revenue requirement is as follows.

Debt Service (\$ in millions)	2019 Budget	2018 Budget	Change
Principal payments	\$5.0	\$4.8	\$ 0.2
Interest payments	8.5	8.7	(0.2)
Subtotal	13.5	13.5	-
25% Debt service reserve	3.4	3.4	-
Total	\$16.9	\$16.9	\$ -

The Series 2013 bonds were issued in November 2013 to refinance the 2009 bonds. The 2009 bonds had been issued to finance the ISO's new headquarters facility in Folsom, California and to fund other capital expenditures. Below is the future amortization schedule for the 2013 bonds.

Amortization Schedule for 2013 Bonds (\$ in millions)	Principal	Interest	Total
2019	\$5.0	\$8.5	\$13.5
2020	5.2	8.2	13.4
2021	5.4	8.0	13.4
2022	5.6	7.8	13.4
2023-2039	152.3	73.7	226.0
Total	\$173.5	\$106.2	\$279.7

The chart below shows the net debt service of the ISO from inception.



VII. Capital / Project Budget and Cash-Funded Capital

The proposed 2019 capital and project budget of \$22 million will fund projects as detailed on the following pages. The Board approves the capital and project budget separately, along with 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 must approve any increases above the current year approved budget.

Future annual capital and project budgets are estimated to be in the range of \$18 million - \$22 million per year and are funded through the cash-funded capital component of the GMC revenue requirement and its related reserves. The cash-funded capital collected via the 2019 GMC revenue requirement is proposed to be \$25 million with the excess used to fund future projects. The funds set aside for future projects will enable the ISO to maintain a stable revenue requirement for an extended period.

Supplemental Board Approved Projects

In addition to the annual capital and project budget process identified above, the Board approved the following supplemental capital projects outside of the annual capital budget limitations:

1. In January 2016, the Board approved the Energy Management System (EMS) Replacement project. The project addresses the need for the EMS to be robust and scalable to meet the expected load. The projected completion of this project is second quarter 2019.
2. The Board also approved several EIM implementation agreements with new entities. Future implementations include Balancing Authority of Northern California/Sacramento Municipal Utilities District in 2019 as well as three more implementations to be completed in 2020 (Los Angeles Department of Water and Power, The City of Seattle, City Light Department and Salt River Project Agriculture Improvement and Power District). As outlined in the agreements, the prospective EIM entities reimburses the ISO for costs incurred around the implementation. Since funding comes from the entity, these projects budgets are outside of the annual capital project budget.

Capital / Project Budget Development Process

The 2019 project prioritization process ran from July 2018 through November 2018. The Program Management Office collaborates with the internal business units and maintains 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 information³.

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 Markets and performance (MAP) Develop infrastructure and tools	10%
Explore opportunities for regional collaboration and technological innovation	Incorporate renewable resources Improve forecasting capabilities MAP	10%
ISO process improvement	Process and quality	10%
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%

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.

³ The latest ISO release planning and project information is available on the ISO website at <http://www.caiso.com/informed/Pages/ReleasePlanning/Default.aspx>

Proposed Project List

The proposed project list provides an indication of the projects proposed for initiation during 2019. 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 2019 priorities may change depending on developments during the remainder of 2018 and into 2019. The actual projects completed during 2019 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.

Proposed Projects for 2019	Amount
Market and Operational Excellence	
Commitment cost (CC) & default energy bids (DEBE)	Large
Day ahead market (DAM) 15 minute	Large
Operations & market services system improvements 2019	Large
Post market consolidation/settlements replacement	Large
Program Office internal labor	Large
Existing transmission contract calculator (ETCC) path limit calculator enhancements	Medium
Energy imbalance market (EIM) identified market power mitigation enhancements 2019	Medium
Lincoln video wall expansion	Medium
Multi-stage generating resources (MSG) transitioning profile	Medium
Energy storage and aggregated distributed energy resource (DER) Phase 3	Small
FERC Order 845	Small
Intertie deviation settlement	Small
Initialization funding for capital projects	Small
Local market power mitigation (LMPM) enhancements	Small
Reducing time gap between real time pre dispatch (RTPD) running time and binding interval	Small
Variable energy resource (VER) forecasting Phase 2	Small
Total	\$10,325,000

Proposed Projects for 2019	Amount
Enhance the Technology Foundation	
Energy management system (EMS) enhancements	Large
Miscellaneous hardware & software purchases	Large
Reliability Coordinator services implementation	Large
FERC Order 841	Medium
Model synchronization and activation (MSAA)	Medium
Review of reliability must-run (RMR) and capacity procurement mechanism (CPM)	Medium
Technology systems improvements for production 2019	Medium
Dispatch operating target (DOT) tariff clarifications	Small
Masterfile service oriented architecture (SOA) phase 2	Small
Robustness (data streams quality) improvements	Small
Statistical Analysis System (SAS) implemented price corrections	Small
Transmission register (TR) replacement	Small
Total	\$9,300,000
Focus on Customer Service and Other Costs	
Facilities replacement reserve	Medium
Campus operations annual funding	Small
External training program development – Computer based training (CBT) phase 3	Small
Total	\$1,225,000
Grid Evolution Readiness and Regional Innovation Opportunities	
Agreement management system (AMS) from access to an application	Medium
Frequency response analysis tool	Small
Interconnection process enhancement	Small
Total	\$1,150,000
Total Proposed Projects for 2019	\$22,000,000

Note: The costs of individual projects are not identified; they are categorized by size as follows: small projects under \$500,000, medium projects from \$500,000 up to \$1 million, and large projects over \$1 million.

VIII. Other Costs and Revenue

The proposed budgeted other costs and revenue for 2019 is \$23.9 million, which is \$7.2 million, or 43%, higher than 2018 primarily due to increased revenues from the EIM administrative charge and forecasting fees plus additional revenue related to the new reliability coordinator services kicking off in 2019.

The details of this category are as follows.

Other Costs and Revenue (\$ in millions)	2019 Budget	2018 Budget	Change
Energy Imbalance Market Administrative Charges	\$8.6	\$7.4	\$1.2
Reliability Coordinator Funding Requirement	4.3	-	4.3
Intermittent Resource (wind and solar) Forecasting Fees	3.8	3.2	0.6
Interest Earnings	3.3	2.5	0.8
California-Oregon Intertie Path Operator Fees	2.0	2.0	-
Generator Interconnection Project Fees	1.5	1.2	0.3
Scheduling Coordinator Application and Other Fees	0.4	0.4	0.0
Total	\$23.9	\$16.7	\$7.2

EIM administrative charges are projected to be \$8.6 million in 2019, which is an increase of \$1.2 million, or 16%, over 2018 due to increased participation in the market. EIM began serving participating utilities in the West in the fall of 2014 and has produced over \$400 million dollars in gross benefits (as of the second quarter of 2018) and will continue to grow strong in April 2019 with the addition of the Balancing Area of Northern California/Sacramento Municipal Utilities District followed by four more utilities in 2020 and 2021.

New to 2019 is the reliability coordinator funding requirement, which represents the amount of revenue the ISO requires to offset the costs the ISO will incur to provide RC services.

The RC funding requirement projection is calculated as follows.

Reliability Coordinator Funding Requirement (\$ in millions)	RC %	2019 Budget
Revenue Requirement (prior to RC Funding Requirement)		\$ 197.8
Prorated RC Funding Requirement for July 2019 - October 2019	2%	\$ (1.3)
Sub-Total		\$ 196.5
Prorated RC Funding Requirement for November - December 2019	9%	\$ (2.9)
Total Revenue Requirement		\$193.5
Prorated RC Funding Requirement for July 2019 - December 2019		\$ (4.3)

Intermittent resource forecasting fees are projected to be \$3.8 million in 2019, which is an increase of \$0.6 million, or 19%, over 2018 due to additional eligible intermittent resources coming on line.

Interest earnings are projected to come in \$0.8 million higher in 2019 due to more favorable short-term interest rates.

Fees for conducting generator interconnection project studies are expected to increase by \$0.3 million, or 25%, to \$1.5 million in 2019 to reflect projected requests.

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

IX. Operating Cost Reserve Adjustment

The operating cost reserve adjustment is a reduction or offset to the ISO GMC revenue requirement for 2019. In any year that the ISO operating reserve account exceeds 15% of the prospective year's O&M budget, the excess goes toward reducing the GMC revenue requirement for the coming year. Additionally the adjustment includes the 25% debt service reserve collected in the prior year and the difference between the budgeted revenues and expenses from the preceding audited fiscal year. In the case of the 2019 GMC revenue requirement, the preceding audited fiscal year is 2017. For 2019, the ISO forecasts a credit from the operating reserve account of \$13.5 million based on the true-up activity from 2017⁴.

A summary of the adjustment is below.

Operating Cost Reserve Adjustment (\$ in millions)	2019 Budget	2018 Budget	Change
Increase/(decrease) in 15% reserve for O&M budget	\$(1.6)	\$(0.7)	\$(0.9)
25% debt service collection from prior year	3.4	3.4	-
True-up of budget to actual revenues and other expenses	11.7	0.8	10.9
Total	\$13.5	\$3.5	\$ 10.0

The calculation of the 15% change is as follows.

Change in 15% Operating Reserve (\$ in millions)	2019 Budget	2018 Budget	Change
Change in O&M budget from prior year	\$189.0	\$178.5	\$10.5
Percentage	15%	15%	-
Change in Operating Reserve requirement	\$28.4	\$26.7	\$1.6

⁴ See Attachment B, Calculation of Operating Cost Reserve Adjustment, for detailed calculation information.

X. Grid Management Charge Calculations

The ISO recovers its costs through separate GMC paid by market participants. The current design, originally approved in 2011 and implemented in 2012, provides for three volumetric charges and five associated fees and charges. The design was updated in 2014; the amendment was approved by FERC on December 18, 2014 and was effective January 1, 2015. The rate design requires a cost of service study be completed every three years to ensure the ISO is properly charging costs to its cost categories. The cost categories consist of market services, system operations, and congestion revenue rights (CRR). The latest cost of service study was completed in 2017 using 2016 data; the revised cost category percentages as a result of the 2016 study were implemented January 1, 2018. The next cost of service study will be completed in 2020 using 2019 data; any changes as a result of the 2019 study will be implemented January 1, 2021.

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
Other Fees and Charges		
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 rates⁵.

⁵ See Attachment A, Actual and Estimated Volumes, for detailed information.

Calculation of Fee Revenue

Fees and Charges	Rate	Estimated Volumes	Estimated Revenue (\$ in thousands)
Bid Segment Fees	\$0.005	69,972,240	\$350
Inter-SC Trade Fees	1.00	2,367,091	2,367
SCID Fees (monthly)	1,000	334	4,008
TOR Fees	0.24	4,604,305	1,105
CRR Auction Bid Fees	1.00	730,456	730
Total			\$8,560

Calculation of Service Category Rates

Component	Market Services	System Operations	CRR Services	Total
Allocation of Revenue Requirement (\$ in thousands)				
Total Revenue Requirement				\$193,563
Adjust for (over) /under collection of 2017 rates	\$864	(\$3,266)	(\$155)	(2,557)
Remaining to allocate				196,119
Percentages	32%	66%	2%	100%
% allocation of costs	62,758	129,439	3,922	196,119
Combined costs	63,622	126,173	3,767	193,563
Deduct Fee Revenue				
Bid Segment Fees	350	-	-	350
Inter-SC Trade Fees	2,367	-	-	2,367
SCID Fees	4,008	-	-	4,008
TOR Fees	-	1,105	-	1,105
CRR Auction Bid Fees	-	-	730	730
Total Fees	6,725	1,105	730	8,560
Calculation of Recoverable Costs				
Costs Less Fees	\$56,897	\$125,068	\$3,037	\$185,003
Projected Volumes				
Volumes	534,285,600	450,806,876	609,489,581	
Less grandfathered supply	-	-3,723,000	-	
Adjusted Volumes	534,285,600	447,083,876	609,489,581	
Resulting Rates	\$0.1065	\$0.2797	\$0.0050	

Summary of Rates

Comparison of Net GMC Revenue Requirements by Service Category (\$ in millions)

Charge Code	Service Category or Fee	2019 Budget	2018 Budget	\$ Variance	% change
4560	Market Service Charge	\$56.9	\$57.0	(\$0.1)	-0.2%
4561	Systems Operations Charge	125.1	129.0	(3.9)	-3.0%
4562	CRR Services Charge	3.0	3.3	(0.3)	-9.1%
4515	Bid Segment Fees	0.4	0.3	0.1	33.3%
4512	Inter-SC Trades Fees	2.4	2.4	-	0.0%
4575	SCID Fees	4.0	3.6	0.4	11.1%
4563	TOR Charges	1.0	0.6	0.4	66.7%
4516	CRR Auction Bid Fees	0.7	1.0	(0.3)	-30.0%
Total		\$193.5	\$197.2	(\$3.7)	-1.9%

Comparison of Grid Management Charge Rates (\$ per unit)

Charge Code	Service Category	2019 Rate	2018 Adjusted Rate	\$ Variance	Comments
4560	Market Service Charge	\$0.1065	\$0.1100	(\$0.0035)	Rate decreased compared to 8/2018 adjusted rate due to lower allocation of Revenue Requirement offset by lower projected volumes.
4561	Systems Operations Charge	\$0.2797	\$0.2964	(\$0.0167)	Rate decreased compared to 8/2018 adjusted rate due to lower allocation of Revenue Requirement offset by lower projected volumes.
4562	CRR Services Charge	\$0.0050	\$0.0038	\$0.0012	Rate increased due to significantly lower projected volumes in 2019 compared to 2018 offset by lower allocation of Revenue Requirement.

EIM Administrative Rates (\$ per unit)

Grid Management Charge	EIM Portion	2019		2018		\$ Variance
		% of GMC Service Charge	EIM Administrative Rates	% of GMC Service Charge	EIM Administrative Rates	
Market Services	Real Time Market	79%	\$ 0.0841	79%	\$ 0.0869	(\$ (0.0028)
System Operations	Real Time Dispatch	39%	\$ 0.1091	39%	\$ 0.1156	(\$ (0.0065)

Reliability Coordinator Service Rates

(\$ per unit)

Reliability Coordinator Service Rate	
Prorated RC Funding Requirement for July 2019 - December 2019 (\$ in millions)	\$ (4.3)
Projected Prorated Volumes in MWh	TBD
Projected RC Service Rates per MWh	TBD

The 2019 RC Service Rates will be released in the first quarter of 2019, which will allow the ISO time to determine its Reliability Coordinator footprint going into its initial service year.

Summary of Charges, Fees, and Supplemental Rates

(\$ per unit)

Summary of Charges, Fees, and Rates	Amount Per Unit	Unit
Grid Management Charges		
Market Service Charge	\$0.1065	MWh
Systems Operations Charge	\$0.2797	MWh
CRR Services Charge	\$0.0050	MWh
Miscellaneous Fixed Fees		
Bid Segment Fees	\$0.0050	# of bid segments
Inter-SC Trade Fees	\$1.00	# of trades
SCID Fees (monthly)	\$1,000	# of SCID
TOR Fees	\$0.2400	MWh
CRR Auction Bid Fees	\$1.00	# of nominations and bids
Supplemental Services Rates		
EIM Market Service	\$0.0841	MWh
EIM System Operations	\$0.1091	MWh
RC Service Rate	TBD	MWh



Actual and Estimated Volumes

Attachment A

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

2012 Actual Units								
Jan-12	41,470,390	36,270,011	46,736,512	217,838	3,483,726	-	223,836	170
Feb-12	38,175,948	33,159,745	43,903,862	205,680	3,207,014	16,769	203,273	171
Mar-12	40,842,102	35,196,343	46,868,371	217,498	3,548,308	15,875	227,618	172
Apr-12	41,226,566	35,125,377	46,854,727	210,420	2,990,604	17,303	424,578	171
May-12	45,578,090	39,217,641	46,271,441	239,352	3,117,538	9,170	388,107	171
Jun-12	46,993,173	40,452,139	44,679,797	227,834	3,210,952	8,994	335,497	171
Jul-12	52,552,966	44,505,089	47,162,239	249,026	3,414,812	8,292	413,234	176
Aug-12	57,266,605	49,091,161	48,956,894	253,052	3,392,776	9,213	371,237	177
Sep-12	50,856,326	43,365,213	46,782,687	244,754	3,309,624	9,458	302,235	177
Oct-12	46,989,785	39,499,041	46,044,613	236,474	3,389,264	14,230	244,313	180
Nov-12	42,673,653	35,960,204	44,907,063	227,776	3,348,360	19,007	207,353	179
Dec-12	43,907,230	37,188,843	50,318,160	237,256	3,544,112	50,003	189,720	183
Total 2012	548,532,833	469,030,805	559,486,365	2,766,960	39,957,090	178,314	3,531,000	2,098



Actual and Estimated Volumes

Attachment A

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

2013 Actual Units								
Jan-13	43,779,521	37,369,820	51,618,373	217,220	3,523,600	15,895	190,566	186
Feb-13	38,297,385	32,448,659	46,618,927	193,990	3,266,442	17,348	239,397	188
Mar-13	41,231,958	35,351,473	51,428,779	222,598	3,584,612	17,986	251,455	194
Apr-13	42,505,186	35,650,561	50,167,807	217,820	3,355,932	16,428	364,617	197
May-13	46,976,059	39,021,934	51,065,016	218,026	3,539,990	16,717	410,603	199
Jun-13	49,911,210	41,313,709	51,646,337	227,552	3,846,524	21,723	342,352	200
Jul-13	55,257,629	46,477,818	57,231,587	268,870	4,199,262	22,469	361,222	201
Aug-13	53,229,909	45,148,734	60,019,278	263,794	4,391,894	20,807	270,650	202
Sep-13	50,098,260	41,732,867	61,580,649	251,958	4,129,712	20,371	214,275	197
Oct-13	44,152,133	37,156,028	65,489,227	217,892	4,093,246	31,067	186,842	194
Nov-13	43,054,231	35,489,302	67,993,796	214,024	4,046,412	32,547	138,976	198
Dec-13	45,569,399	38,057,980	72,206,389	223,432	4,524,992	108,864	191,364	200
Total 2013	554,062,881	465,218,884	687,066,163	2,737,176	46,502,618	342,222	3,162,319	2,356



Actual and Estimated Volumes

Attachment A

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

2014 Actual Units								
Jan-14	41,916,948	35,955,164	70,627,561	208,200	4,472,836	35,293	161,740	192
Feb-14	37,630,907	32,061,563	70,125,501	189,790	3,954,726	37,283	154,960	194
Mar-14	41,964,737	35,193,766	77,546,233	213,966	4,364,666	37,439	163,477	197
Apr-14	42,418,534	35,691,410	70,600,199	205,372	4,312,460	39,386	230,018	200
May-14	46,814,631	39,405,493	65,725,167	216,512	4,479,448	34,215	304,968	198
Jun-14	47,580,782	40,390,108	67,850,745	220,828	4,533,968	36,765	268,891	196
Jul-14	55,025,692	46,575,523	75,947,941	241,100	4,941,786	33,522	287,956	201
Aug-14	53,984,563	45,137,708	81,142,260	242,496	4,921,252	34,212	284,393	200
Sep-14	51,112,789	42,955,809	80,617,059	225,858	4,798,540	38,071	235,526	198
Oct-14	47,201,350	38,872,003	100,804,167	217,024	4,701,466	53,656	199,361	202
Nov-14	40,302,942	33,998,000	84,623,932	197,838	4,434,130	60,567	170,093	205
Dec-14	43,055,388	36,575,502	93,924,753	206,464	4,733,938	208,375	181,997	207
Total 2014	549,009,262	462,812,049	939,535,518	2,585,448	54,649,216	648,784	2,643,379	2,390



Actual and Estimated Volumes

Attachment A

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

2015 Actual Units								
Jan-15	41,477,031	35,421,771	87,665,561	193,662	4,800,024	59,079	192,988	204
Feb-15	37,190,221	31,431,356	81,334,029	175,534	4,438,108	67,528	165,605	202
Mar-15	42,920,596	35,928,249	87,777,329	192,190	4,971,736	62,444	250,365	205
Apr-15	41,990,016	34,743,923	84,154,793	184,772	4,725,408	54,904	251,571	214
May-15	43,534,101	35,905,940	78,907,269	196,492	4,716,922	52,138	230,249	216
Jun-15	49,310,493	41,406,503	68,830,408	201,326	5,134,062	53,671	248,449	213
Jul-15	53,949,417	44,690,920	75,218,475	219,530	4,861,702	58,001	296,023	217
Aug-15	55,591,161	46,228,182	74,800,817	220,522	4,934,262	54,937	300,673	219
Sep-15	51,741,664	43,474,914	72,374,036	209,958	4,780,338	57,915	278,713	219
Oct-15	47,306,871	39,483,777	69,453,993	200,180	4,808,362	69,184	200,790	220
Nov-15	40,588,908	34,185,161	71,406,854	178,076	4,461,582	73,322	171,278	216
Dec-15	44,487,358	37,086,724	68,934,954	192,168	4,734,942	191,556	174,441	225
Total 2015	550,087,837	459,987,419	920,858,519	2,364,410	57,367,448	854,679	2,761,145	2,570



Actual and Estimated Volumes

Attachment A

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

2016 Actual Units								
Jan-16	42,266,502	35,205,345	58,723,112	181,760	4,636,070	56,441	136,501	226
Feb-16	38,242,052	32,063,733	59,160,131	177,090	4,360,806	68,337	158,847	228
Mar-16	42,465,768	35,037,653	66,064,698	193,114	4,712,180	66,507	199,365	232
Apr-16	41,612,181	34,447,057	61,191,096	199,228	4,765,154	67,127	269,498	239
May-16	43,979,064	36,992,445	63,114,378	214,838	5,139,592	70,386	306,438	242
Jun-16	50,195,316	42,588,143	62,299,386	225,426	5,127,418	66,337	263,748	247
Jul-16	53,784,564	46,583,921	66,843,208	230,808	5,305,540	60,504	264,674	252
Aug-16	53,369,579	45,855,510	70,130,476	236,742	5,284,354	58,347	266,431	254
Sep-16	47,197,653	40,219,578	68,008,824	222,096	5,171,054	54,574	242,689	257
Oct-16	44,512,132	36,778,826	66,025,122	206,998	5,573,306	72,242	221,933	266
Nov-16	40,722,032	34,679,607	60,056,145	186,910	5,328,268	59,765	139,575	275
Dec-16	42,134,758	36,397,069	62,670,453	200,006	5,420,618	253,428	157,543	276
Total 2016	540,481,600	456,848,887	764,287,029	2,475,016	60,824,360	953,995	2,627,243	2,994



Actual and Estimated Volumes

Attachment A

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	43,034,411	36,862,670	66,225,336	174,622	5,205,586	58,821	172,149	274
Feb-17	38,226,744	32,199,995	60,748,988	158,500	4,765,778	61,788	135,505	276
Mar-17	40,618,235	34,483,825	66,443,290	174,018	5,267,614	66,952	200,827	275
Apr-17	40,428,234	33,616,712	64,998,622	199,744	5,220,122	67,423	252,706	278
May-17	44,541,613	37,507,361	65,920,690	201,118	5,496,430	73,357	350,337	278
Jun-17	48,535,231	41,888,513	64,707,064	205,082	5,494,366	63,564	332,165	284
Jul-17	54,641,006	47,435,784	72,507,166	215,110	5,690,786	58,608	327,077	286
Aug-17	54,824,270	47,017,751	74,393,081	203,910	5,725,446	66,164	299,640	291
Sep-17	48,323,113	41,658,279	73,908,881	195,770	5,426,082	69,381	262,398	298
Oct-17	44,292,291	37,816,174	69,560,658	181,236	5,584,084	81,819	312,762	301
Nov-17	40,055,798	34,393,898	65,527,692	183,722	5,060,398	81,045	341,547	299
Dec-17	41,279,527	36,257,662	67,518,951	184,562	5,272,128	313,883	420,106	299
Total 2017	538,800,472	461,138,623	812,460,419	2,277,394	64,208,820	1,062,805	3,407,219	3,439



Actual and Estimated Volumes

Attachment A

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

2018 Actual Units from January to October & Estimate from November to December.								
Jan-18	40,581,592	35,192,541	72,836,487	167,642	5,198,750	62,160	297,144	305
Feb-18	37,830,125	31,763,380	65,488,442	160,956	4,732,582	60,184	242,274	305
Mar-18	41,075,258	34,079,530	66,888,589	174,284	5,325,110	60,474	346,503	306
Apr-18	39,788,838	32,919,364	62,889,737	180,400	5,380,146	51,408	373,257	319
May-18	43,252,949	35,820,630	65,177,511	183,256	5,829,922	54,667	476,907	323
Jun-18	46,113,588	38,451,505	63,726,392	197,328	6,018,982	64,826	479,127	328
Jul-18	58,034,458	48,327,521	70,844,513	224,344	6,601,730	70,021	485,323	334
Aug-18	55,630,269	47,302,023	71,015,782	239,172	7,025,780	70,173	470,217	333
Sep-18	46,514,531	39,173,581	67,344,750	231,184	6,618,150	70,794	477,177	334
Oct-18	44,177,933	36,671,371	69,093,395	206,436	6,468,862	82,796	387,064	333
Nov-18	41,030,430	34,432,384	79,412,071	203,527	4,615,510	79,826	160,315	298
Dec-18	43,436,739	36,741,897	76,663,054	212,228	5,036,400	208,549	171,327	298
Total 2018	537,466,709	450,875,726	831,380,723	2,380,756	68,851,924	935,878	4,366,634	3,816



Actual and Estimated Volumes

Attachment A

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 Estimated Units								
Jan-19	40,378,684	35,016,579	54,627,365	167,642	5,250,738	46,620	297,144	334
Feb-19	37,640,975	31,604,563	49,116,332	160,956	4,779,908	45,138	242,274	334
Mar-19	40,869,882	33,909,132	50,166,442	174,284	5,378,361	45,356	346,503	334
Apr-19	39,589,894	32,754,767	47,167,303	180,400	5,433,947	38,556	373,257	334
May-19	43,036,684	35,641,526	48,883,133	183,256	5,888,221	41,000	476,907	334
Jun-19	45,883,020	38,259,247	47,794,794	197,328	6,079,172	48,620	479,127	334
Jul-19	57,744,285	48,085,883	53,133,385	224,344	6,667,747	52,516	485,323	334
Aug-19	55,348,138	46,978,873	53,261,836	239,172	7,096,038	52,630	470,235	334
Sep-19	46,281,958	38,977,714	50,508,563	231,184	6,684,331	53,096	477,177	334
Oct-19	43,958,528	36,520,785	51,820,046	206,436	6,533,551	62,097	386,458	334
Nov-19	40,586,635	33,542,491	51,675,635	196,837	4,868,149	62,814	275,490	334
Dec-19	42,966,917	35,792,315	51,334,748	205,252	5,312,077	182,015	294,413	334
Total 2019	534,285,600	447,083,876	609,489,581	2,367,091	69,972,240	730,456	4,604,305	4,008

Change from 2012 Actual	-2.6%	-4.7%	8.9%	-14.5%	75.1%	309.6%	30.4%	91.0%
Change from 2013 Actual	-3.6%	-3.9%	-11.3%	-13.5%	50.5%	113.4%	45.6%	70.1%
Change from 2014 Actual	-2.7%	-3.4%	-35.1%	-8.4%	28.0%	12.6%	74.2%	67.7%
Change from 2015 Actual	-2.9%	-2.8%	-33.8%	0.1%	22.0%	-14.5%	66.8%	56.0%
Change from 2016 Actual	-1.1%	-2.1%	-20.3%	-4.4%	15.0%	-23.4%	75.3%	33.9%
Change from 2017 Actual	-0.2%	-2.2%	2.3%	4.5%	7.2%	-11.9%	28.2%	11.0%
Change from 2018 Actual + Estimate	-0.6%	-0.8%	-26.7%	-0.6%	1.6%	-21.9%	5.4%	5.0%

The latest GMC rates as well as a history of the rates is available on the ISO public site: http://www.caiso.com/Documents/GMCRatesfor2004-2018EffectiveAug12018_071218.pdf

Attachment B

Calculation of Operating Cost Reserve Adjustment

\$ in '000

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

- Prior year's 25% debt service reserve
- 2017 true-up
- 2018 estimates
- Change in the 15% O&M 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	\$ 3,400	\$ 3,400	\$ -
2017 true-up	-	11,660	11,660
Current year estimates	-	-	-
15% O&M Reserve	(1,580)	(1,580)	-
2019 Reserve Credit / (Debit) from 2017 Operations	\$ 1,820	\$ 13,480	\$ 11,660
(a) Plan assumes prior year expenses and revenues were equal to budgeted amounts			
(b) Revised reflects the true -up of prior year activities			

Attachment B

Calculation of Operating Cost Reserve Adjustment
\$ in '000

2017 True Up			
Description	Budget	Actual	Difference
Revenue			
GMC Revenue	\$ 195,300	\$ 198,282	\$ 2,982
Other Income	13,300	17,571	4,271
Realized loss on Investments	-	(131)	(131)
Total revenue	208,600	215,722	7,122
Expenses			
Expenses	(173,637)	(165,135)	8,502
Debt Service: Principal	(4,800)	(4,800)	-
Debt Service: Interest	(8,700)	(8,766)	(66)
Debt Service Reserve	(3,400)	(3,400)	-
Cash Funded Capital	(20,000)	(20,000)	-
Capital Funded by EIM Fees Adjustment	-	(3,992)	(3,992)
Generator Fines Interest Adjustment	-	95	95
Total expenses	(210,537)	(205,999)	4,538
Impact to Operating Reserve			
Net Increase in Prior Year true-up	\$ (1,937)	\$ 9,723	\$ 11,660

Attachment B

Calculation of Operating Cost Reserve Adjustment

\$ in '000

2018 Estimates			
Description	Budget	Estimate	Difference
Revenue			
GMC Revenue	\$ 197,250	\$ 197,250	\$ -
Other Income	16,708	16,708	-
Total revenue	213,958	213,958	-
Expenses			
O&M	(178,503)	(178,503)	-
Debt Service: Principal	(4,800)	(4,800)	-
Debt Service: Interest	(8,700)	(8,700)	-
Debt Service Reserve	(3,400)	(3,400)	-
Cash Funded Capital	(22,000)	(22,000)	-
Total expenses	(217,403)	(217,403)	-
Impact to Operating Reserve			
Net Increase in current year estimates	\$ (3,445)	\$ (3,445)	\$ -

Change in 15% Operating Reserve			
Description	2018 Budget	2019 Proposed Budget	Change
Change in O&M budget from prior year	\$ 178,503	\$ 189,030	\$ (10,527)
Change in 15% Operating Reserve requirement	\$ 26,775	\$ 28,355	\$ (1,580)