SUSTAINABILITY ROADMAP

2018 – 2019

CalPERS

EXECUTIVE SUMMARY

The California Public Employees' Retirement System (CalPERS) has prepared a Roadmap document, detailing actions and steps taken to meet the objectives, targets and requirements of the Governor Brown's Executive Orders as they apply to the facilities and operations.
For more than eight decades, CalPERS has been a steward of retirement and health security for state, school, and public agency members; people who have invested their lifework in public service. CalPERS is the largest defined benefit public pension in the United States and has a total fund market value of approximately $344.79 billion in assets. The pension fund serves more than 1.8 million current and retired members in the CalPERS retirement system and administers benefits for more than 1.4 million members and their dependents in the health programs.

The original CalPERS building, Lincoln Plaza North (LPN), was built in 1986. Subsequently in 2006, CalPERS expanded its Lincoln Plaza Headquarters to include the Lincoln Plaza East/West (LPEW) building. In 2011, the Lincoln Plaza South (LPS) building located at 400 R Street was added to Lincoln Plaza Headquarters. Cumulatively, over a million-square foot campus of buildings was developed over time. In May 2014, LPN was recertified Leadership in Energy and Environmental Design for Existing Building Operations and Maintenance (LEED® O+M) at the Gold level by the United States Green Building Council. In August 2014, LPEW was recertified LEED® O+M Platinum, and in October 2015, LPS was certified LEED® O+M Gold.

This Roadmap consists of five plans: Climate Adaptation, Zero Emissions Vehicles, Energy, Water Efficiency and Conservation and Green Building Operations.

The Climate Change Adaptation section assesses the risk that a changing climate poses to existing facilities and operations. As temperatures increase, precipitation becomes less predictable and sea levels rise. Therefore, it is important to recognize the impact that existing facilities have on the surrounding community and to integrate climate change into future plans. In addition to the current strategies discussed in this section, CalPERS is considering increasing the temperature setpoint during summer months, adding onsite thermal and water storage, installing a cool roof and building battery. The goal of these potential initiatives is to minimize the impact of extreme weather fluctuations on occupants, the facilities, surrounding populations, and environment. CalPERS is doing their part to combat climate change through their energy efficient facilities, heat island reduction strategies and promotion of alternative transportation options.

The Zero Emissions Vehicle (ZEV) section evaluates state agencies progress towards integrating zero emissions vehicles into fleet and installing electric vehicle charging infrastructure. Transportation is identified as one of the main contributors to greenhouse gas emissions in California. Therefore, it is important to integrate alternative fuel vehicles and increase accessibility of electric vehicle charging infrastructure to accommodate more alternative fuel vehicles, thus reducing carbon emissions and preserving the environment. As a supporter of sustainability, CalPERS will add 17 hybrids and one zero emission vehicle to its fleet within the next five years. Additionally, CalPERS has developed a multi-year electrical vehicle charging infrastructure plan that will meet the State's new goals. Lincoln Plaza currently has 20 Level 2 electric vehicle charging infrastructure serving fleet, employee and visitor parking consisting of and will add an additional 71 Level 1 and 4 Level 2 stations for a total of 95 charging stations within the next five years to meet the new goals. CalPERS will continue to support the reduction of greenhouse gas emissions by purchasing alternative fuel vehicles and providing ZEV infrastructure accessible to employees and visitors.

The Energy section describes CalPERS progress towards meeting the Governor's energy goals at the Lincoln Plaza Headquarters. These high performing buildings have evolved over time to

become more energy efficient than the original design. Collaboration between designers and team members has allowed many energy efficiency practices and projects to be implemented into the facility, including the consideration of renewable energy to meet the Governor's energy goals. In 2016, CalPERS received Association of Energy Engineers (AEE) Sustainability Award for continual improvement through energy reduction. The AEE Northern California Chapter recognizes local organizations for their leadership in sustainability and innovation in management practices. CalPERS' significant energy conservation practices include hot and cold aisle containment in the data centers, purchasing Energy Star equipment, and retro-commissioning. Considerations for future implementation include energy saving measures such as the functionality and feasibility of a night flush cycle, optimal start up, night set back, load shedding, boiler and chiller lockout, and Sequence of Operations. As a leader in sustainability, CalPERS continues to look for new and innovative ways to reduce energy consumption.

The Water section helps state agencies to maximize water efficiency. CalPERS has significant conservation accomplishments in water efficiency and conservation. These are attributed to the climate appropriate landscaping, cooling tower water recapture project, drought measures and ongoing maintenance of equipment to ensure optimal performance. CalPERS implemented additional initiatives to preserve the quality of water and conservation. A hygienist performs semiannual water testing for the cooling towers, boilers, recaptured water, irrigation and domestic water to maintain healthy conditions, prevent system scale and corrosion and to optimize cycles of concentration. These efforts were proven to be successful when CalPERS was awarded the 2016 Sacramento Area Sustainable Business Award from the Business Environmental Resource Center (BERC) for CalPERS water conservation efforts. BERC recognizes top environmentally proactive Sacramento area businesses each year whose work practices demonstrate an outstanding commitment to enhancing sustainability. To increase water savings, in 2017, the water recapture projected was expanded into a distribution system that recaptures the cooling tower water and uses the water for irrigation and maintenance purposes where potable water is not required. CalPERS will continue to research and evaluate new water conservation measures that will contribute to achieving the Governor's sustainable goals.

The Green Operations section addresses CalPERS initiatives to meet the directives the Governor has given state agencies to demonstrate sustainable operations and lead the way by implementing sustainable policies. CalPERS practices green building operations by performing energy efficient projects and upgrades, and purchasing fuel-efficient fleet and renewable energy. The initiatives were proven to be successful when CalPERS was recognized by The Climate Registry (TCR) in 2016 for having the highest percent reduction of 76% in 2015, compared to a 2010 baseline, in entity-wide GHG emissions as compared to other state agencies. TCR is a non-profit governing body that maintains the standards that allow agencies to measure, report and verify their entity-wide GHG emissions. Participating in SMUD's Greenergy program to offset 100% of electrical energy, along with, purchasing renewable energy certificates to offset Lincoln Plaza's carbon associated with electrical energy contributed to CalPERS significant greenhouse gas reduction. In addition, CalPERS follows the green policies and standards set-forth by the Governors Executive Order, Green Building Action Plan and legislation, such as, LEED® certification, environmentally preferred purchasing and indoor environmental air quality. CalPERS will continue to implement green building best practices and efficiency measures in daily operations to reduce CalPERS' carbon footprint.

Douglas Hoffner

Deputy Executive Officer
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Climate Change Adaptation Plan

Progress Report and Plan for Meeting the Governor's Sustainability Goals for California State Agencies

California Public Employees' Retirement System

Edmund G. Brown Jr., Governor

December 2017

California Public Employees' Retirement System

Sustainability Road Map 2018-2019:

Climate Change Adaptation

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Acronyms

AB	Assembly Bill
EHT	Extreme Heat Threshold
EO	Executive Order
GCM	Global Circulation Model
GHG	Greenhouse Gas
RCP	Representative Concentration Pathway
SB	Senate Bill

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Climate Change Adaptation
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous Executive Orders directing sustainable state operations. The order relevant to climate adaptation is:

Executive Order B-30-15

Executive Order (EO) B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050. To support these goals, this Order requires numerous state agencies to develop plans and programs to reduce emissions. It also directs state agencies to take climate change into account in their planning and investment decisions and employ life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives. State agencies are directed to prioritize investments that build climate preparedness and reduce greenhouse gas emissions, prioritize natural infrastructure, and protect the state's most vulnerable populations.

Legislative Direction

Several pieces of legislation were signed in 2015-2016 that codified several elements of the EO. These include the following:

- Assembly Bill (AB) 1482 (Gordon, 2015): Requires that the California Natural Resources Agency (CNRA) update the state's adaptation strategy, Safeguarding California, every three years. This strategy directs state agencies to promote climate adaptation in

planning decisions and ensure that state investments consider climate change impacts, as well as the use of natural systems and natural infrastructure. (Public Resources Code Section 71153)

- Senate Bill (SB) 246 (Wieckowski, 2015): Established the Integrated Climate Adaptation and Resiliency Program within the Governor's Office of Planning and Research to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change. (Public Resources Code Section 71354)
- SB 2800 (Quirk, 2016): Requires state agencies to take the current and future impacts of climate change into planning, designing, building, operating, maintaining, and investing in state infrastructure. CNRA will establish a Climate-Safe Infrastructure Working Group to determine how to integrate climate change impacts into state infrastructure engineering. (Public Resources Code Section 71155)

State Resources and Guidance Documents

California has invested significant resources in understanding the risks of climate change to the State and actions available to respond to and reduce these risks. These include the following:

- **Safeguarding California**: The state's climate adaptation strategy organized by sector. Each sector identifies risks from climate change and actions to reduce those risks.
- **Safeguarding California Implementation Action Plans**: Directed under EO B-30-15, the Implementation Action Plans outline the steps that will be taken in each sector to reduce risks from climate change.
- **Building a Resilient California**: Prepared under direction of EO B-30-15, this document provides a framework for state agencies to integrate climate change into planning and investment, including guidance on data selection and analytical approach.
- **California's Climate Change Assessments**: California has completed three comprehensive assessments of climate change impacts on California. Each assessment has included development of projections of climate impacts on scale that is relevant to state planning (i.e., downscaled climate projections). These data are available through Cal-Adapt, an online data visualization and access tool.

CLIMATE CHANGE ADAPTATION

Executive Order B-30-15 directs state agencies to integrate climate change into all planning and investment. Planning and investment can include the following:

- Infrastructure and capital outlay projects
- Grants
- Development of strategic and functional plans
- Permitting
- Purchasing and procurement
- Guidance development
- Regulatory activity
- Outreach and education

This template will focus on the first three of these activities, and follows the guidance created by the Technical Advisory Group developed under EO B-30-15 to assist state agencies to complete this task.

Climate Change Risks to Facilities

For all infrastructure, it is important to assess the risk that a changing climate poses to an asset or project such as sea level rise or increasing daily temperatures. It is also important to recognize the impact that an infrastructure project has on the surrounding community, individual and community resilience.

To determine how to consider climate change for a given project, plan or existing infrastructure, this department will consider the following screening questions.

1. What is the lifetime of the facility, planned project or plan?
2. Could it be affected by changing average climate conditions or increases in extreme events over its lifetime?
3. What is the consequence of that disruption?
4. Will that disruption affect vulnerable populations, critical natural systems, critical infrastructure, or other assets?
5. Will that disruption cause irreversible effects or pose an unacceptable risk to public health and safety?

The California Public Employees' Retirement System (CalPERS) existing facility, Lincoln Plaza, serves as the Headquarters for CalPERS. Lincoln Plaza, is located in downtown Sacramento, California and has approximately one million square feet of office space and an onsite data center. Lincoln Plaza consists of three buildings on contiguous blocks; Lincoln Plaza North (LPN, 400 P Street), Lincoln Plaza East/West (LPEW, 400 Q Street) and Lincoln Plaza South (LPS, 400 R Street).

CalPERS was progressive when designing Lincoln Plaza by focusing on efficiency and reducing environmental impact from daily operations. All three of the buildings are high-performing with energy performance within the 86th percentile of buildings in the national population.

Lincoln Plaza reached this high percentile by operating at an advanced level of efficiency and having passive envelope features that make increasing temperatures less of a problem than

traditionally designed facilities. Also, landscaping, terracing, shade trees and underground parking have been put in place to support the surrounding community by reducing the urban heat island affect. However, major flooding or extended power outages of the downtown Sacramento area caused by an extreme climate event would temporarily affect the facilities operation of Lincoln Plaza. If this occurred, critical operations would have to be relocated to another location until the building is restored.

This Climate Change Adaptation Plan is a reference tool that CalPERS will review periodically regarding potential risks from climate change for their existing facilities, as no new facilities are currently planned.

Understanding Climate Risk to Existing Facilities

It is important to understand the complexity of climate change and extreme weather risks to facilities and business operations. Once these risks have been identified and addressed, businesses can begin to develop operational preparedness policies for future change and building resilience.

Risk from Increasing Temperatures

Under a changing climate, temperatures are expected to increase – both at the high and low end. As a result, facilities will experience higher maximum temperatures and increased minimum temperatures.

In Table 1, the annual mean maximum temperatures and annual mean minimum temperatures for different time periods are shown for Lincoln Plaza. The annual mean maximum temperature increases from 74 degrees Fahrenheit from 1961 through 1990 to a projected 82.5 degrees Fahrenheit, at the end of this century, from 2070 through 2099. This indicates that the maximum temperatures will increase in future years. The annual mean minimum temperature increases from 48.7 degrees Fahrenheit from 1961 through 1990 to a projected 56.9 degrees Fahrenheit from 2070 through 2099. This indicates that the minimum temperatures will also increase over time.

Table 1: Facilities Most Affected by Changing Temperature

Facility Name	Annual Mean Maximum Temperature (1961 – 1990)	Annual Mean Maximum Temperature (2031 – 2060)	Annual Mean Max T (2070-2099)	Annual Mean Minimum Temperature (1961 – 1990)	Annual Mean Minimum Temperature (2031 – 2060)	Annual Mean Min T (2070-2099
Lincoln Plaza	74.0 °F	78.9 °F	82.5 °F	48.7 °F	53.1 °F	56.9 °F

Increase in annual mean temperatures can affect facility operations and occupant health. By the end of the century, the maximum and minimum temperatures are expected to increase approximately 8 degrees Fahrenheit. During the hot summer months, the building cooling systems may run less efficiently due to the increase in temperature. As a result, more electricity

and water will be needed for the mechanical equipment to cool to the existing set point. During the cold winter months, the increased temperatures will be a benefit since less natural gas is needed to heat the buildings. However, increased temperatures should not drastically affect occupant health, unless occupants spend extended periods of time outside.

In addition to changing average temperatures, climate change will increase the number of extreme heat events across the state. Extreme events are likely to be experienced sooner than changes in average temperatures.

The extreme heat threshold (EHT) for Lincoln Plaza is 103.5 degrees Fahrenheit, as seen in Table 2. The average numbers of days above the EHT were 4.3 from 1961 to 1990. As the end of the century is neared, 2070 through 2099, the average number of days above the EHT increases to 42. This is an increase in the average number of days above the EHT of 37.7.

Table 2: Facilities that Will Experience the Largest Increase in Extreme Heat Events

Facility Name	Extreme heat threshold (EHT)	Average number of days above EHT (1961-1990)	Average number of days above EHT (2031-2060)	Increase in number of days above EHT by mid-century	Avg. # days above EHT (2070-2099)	Increase in Avg. # days above EHT by end of century
Lincoln Plaza	103.5 °F	4.3	21	16.7	42	37.7

As the periods of extreme heat become more prevalent, there will be more stress put on the facilities operation. The mechanical cooling systems rely on the cooling towers to cool the building. During periods of extreme heat, electricity and water demand will be higher than normal so the mechanical equipment can cool the building to the existing setpoint. While the building occupants will not be affected by an increase in temperatures of a couple degrees, the data center critical infrastructure in LPW will have to be kept at the appropriate temperatures.

The data center located in LPW follows The Data Center Energy Efficiency Management Memo 14-09. The Memo recommends keeping the thermostat in data centers between 73 and 81 degrees according to the ASHRAE-TC 9.9 guidelines. However, the data center houses certain legacy equipment that may not be able to handle temperatures at 80 or above. Therefore, using over 300 temperature alarm points distributed throughout the data center, CalPERS runs the equipment at the highest safe temperature at all times to save energy.

Extreme heat events also make the possibility of blackouts and brownouts more likely. LPN and LPEW buildings have backup generators to support critical loads such as fire, life, safety and the data center. However, prolonged loss of power will make it difficult for the occupants of the buildings to continue work.

During high temperature days, building occupants will be comfortable and safe while they are inside. However, a long period of exposure to extreme heat may result in fatigue and sickness.

Extreme heat events greater than 104 degrees Fahrenheit,[1] make the human body more susceptible to heat exhaustion and heat stroke. Increased temperatures over extended periods also decrease outdoor air quality. CalPERS retirees and members could be exposed to the extreme heat as well when they visit the Sacramento Regional Office, located at Lincoln Plaza, 400 Q Street. This location offers retirement planning services and member events. Since the members are retired they can often be classified as part of the sensitive group to extreme temperatures. The regional office has a spacious waiting room equipped with HVAC and is in close proximity to water fountains, along with, CalPERS amenities shop for their hydration and nutrition needs. For visitor's convenience, there is a sign outside of the regional office providing directions and information for the onsite restaurant and café.

Lincoln Plaza's building envelope, landscaping, underground parking, building systems, partnerships, and amenities allows the facilities to be well positioned to combat increased temperatures. The building envelope design has many aspects that help reject solar heat gain such as light-colored roofs, insulation, double pained windows, overhangs to shade windows, low emissivity or reflective window coatings and interior sun shades. Rejecting solar heat gain prevents the building from becoming warmer and helps reduce the needed amount of mechanical cooling.

LPN and LPEW were designed with terraces to support landscaping, including drought tolerant plants and trees. The areas surrounding the buildings also have drought tolerant landscaping and shade trees to help reduce the urban heat island effect. The underground parking garage in both buildings reduces the amount of hardscape that can retain solar heat gain, thus reducing the heat island affect.

The building systems are also maintained and operated with a focus on energy efficiency and sustainability. To ensure that the facilities will become more efficient over time, as equipment reaches end of life, studies are performed to determine the most efficient replacement equipment. This study and design considers the effects of increasing temperatures over the equipment's life.

To reduce electricity usage during the summer months, CalPERS partners with the Sacramento Municipal Utility District (SMUD) through their demand response program. This program helps to reduce energy demand in buildings to prevent brownouts during the hot summer months. From May until October, circulation spaces, hallways and corridors, are put into an energy saving half lighting mode. During a demand event, the escalators and people movers are turned off to reduce energy demand.

Lincoln Plaza has several amenities to reduce the impact of extreme events for occupants and visitors, such as an onsite gym, café and coffee shop. During days with extreme heat and poor air quality, these amenities allow occupants and visitors to remain at Lincoln Plaza. In addition to the amenities, LPN and LPEW are connected by an underground tunnel. This tunnel provides

1 CalEPA and CDPH. *Preparing California for Extreme Heat: Guidance and Recommendations.* October 2013. http://www.climatechange.ca.gov/climate_action_team/reports/Preparing_California_for_Extreme_Heat.pdf

building occupants and visitors the ability to travel around campus without leaving the buildings. The main reason for an occupant to travel outside is to leave the site for transportation at the end of the work day. As mentioned previously, Lincoln Plaza has a large parking garage under LPN and LPEW. The underground parking garages are cool and allow building occupants and visitors to avoid the extreme heat of a summer day. For occupants who do not drive to work, Lincoln Plaza is a short walk with trees shading the path to the local bus and train.

To promote employee awareness of poor outdoor air quality days and public transportation options, CalPERS works in partnership with Spare the Air. As new research is released on the effects of high outside temperatures on health, one finding is that increasing the temperatures inside buildings will help with the health of building occupants. This simultaneously increases building efficiency by reducing the energy demand. Also, Lincoln Plaza's mechanical systems have particulate filters that filter out pollutants from the outside air. Semiannual air testing is also performed to ensure that the quality of the indoor air meets industry best practices.

As CalPERS plans for a future with increasing temperatures, there are technologies that can be studied and implemented to increase efficiency of the facility operations. A simple change that can be implemented is increasing the setpoint during the summer months. To reduce both solar heat gain and the urban heat island effect, cool roofs can be installed when the current roofs reach end of life. In LPEW the existing shades could be replaced with ones that are white facing outward to reject solar heat gain. To aid efficiency in the cooling system, outside air or free cooling could be used as well as onsite thermal storage. The thermal storage system would allow chilled water to be made during the cooler part of the day and save it for a period of the day when the demand for cooling is the highest and electricity is most expensive.

Going forward, CalPERS will conduct a study to determine which of these measures are feasible over the next several years. Considering the worst case scenarios, such as, erratic electrical grid, and frequent power outages, a building battery could be implemented to store electricity for outages allowing the building to remain operational. Occupant's schedules could be shifted forward, allowing the work day to start earlier so the building can be closed during the hottest part of the day. This strategy will prevent peak electricity costs and potential outages during heat waves. If water scarcity becomes an issue, storing water onsite might also become necessary to keep the facility operational.

Risks from Changes in Precipitation

The impacts of climate change on the amount of precipitation that California will receive in the future are slightly less certain than the impacts on temperature; however, it is expected that California will maintain its Mediterranean climate pattern (dry summers and wet winters) with warmer summers and more precipitation in the winter as rain rather than snow. A significant rainfall can result in flooding, but will also result in shifts in earlier snow pack runoff and higher runoff volumes.

Table 3, provides information that predicts how Lincoln Plaza will be affected by an increase in precipitation. The annual mean precipitation for 1961 through 1990 was 18 inches. By the end of the century the annual mean is expected to be 22.6 inches, an increase of 26 percent.

Table 3: Facilities that will be Most Impacted by Projected Changes in Precipitation

Facility Name	Annual Mean Precipitation (1961 – 1990)	Annual Mean Precipitation (2031 – 2060)	Percent Change by mid-century	Annual Mean Precipitation (2070 – 2099)	Percent change by end of century
Lincoln Plaza	18.0"	20.9"	16%	22.6"	26%

Increased precipitation does not directly affect the facilities operation or occupant health, however, the potential side effects of large storm events, such as flooding would. Lincoln Plaza is located near the Sacramento River. The Sacramento Climate Action Plan noted that the Sacramento Rivers are already at peak capacity and extreme storms will make floods more likely in the future.[2]

Lincoln Plaza has measures in place to prevent light flooding such as walls and weirs to protect the building. One of the essential equipment rooms, the electrical room, located on the ground floor, is the main issue in keeping the buildings operating during a flood. Another essential room is the data center, located on the fourth floor, and given advanced warning, would be powered down prior to a flood event.

In the case of heavy flooding, there is a procedure in development for powering down the facilities within 10 hours or if needed, within two hours. CalPERS currently has a procedure in place to restore the building if it is flooded including an assessment of damage to the windows or facade of the building from strong current and debris. If the risk of flooding becomes a clear pattern then CalPERS may reevaluate the location of the headquarters. Until that time CalPERS will remain at Lincoln Plaza.

Risks from Sea Level Rise

Increasing global temperatures are contributing to rising sea levels. Rising sea levels will result in inundation of coastal areas and increased flooding due to storm surges. The California Ocean Protection Council (OPC) has issued guidance for state agencies on what level of sea level rise to consider. The Guidance document provides the following estimates of sea level rise for the California Coast, which are based on a study by the National Academy of Sciences:

2 The City of Sacramento. *Sacramento Climate Action Plan.* January 13, 2012. http://ascentenvironmental.com/files/9714/0537/0505/Sacramento_CAP_Final_Draft.pdf

Table 4: Facilities at Risk from Rising Sea Levels

Time Period	North of Cape Mendocino	South of Cape Mendocino
2000 - 2030	-4 to 23 cm (-0.13 to 0.75 ft)	4 to 30 cm (0.13 to 0.98 ft)
2000 – 2050	-3 to 48 cm (-0.1 to 1.57 ft)	12 to 61 cm (0.39 to 2.0 ft)
2000 – 2100	10 to 143 cm (0.3 to 4.69 ft)	42 to 167 cm (1.38 to 5.48 ft)

An accompanying OPC resolution recommends that departments base analyses on estimates of sea level rise in the upper two-thirds of the range.

Through the Cal-Adapt Sea Level Rise Climate Tool, the Sacramento-San Joaquin Delta will be affected by sea level rise. The effects of sea level rise on the San Joaquin Delta will impact the sea level rise of Washington Lake in West Sacramento which is connected to the Sacramento River. With a sea level rise of 0 or the more drastic, 1.41 meters, the maximum inundation depth during a likely 100 year storm will be 4+ meters.

There are locks in place to separate Lake Washington and the Sacramento River. The Cal-Adapt model ends at Lake Washington, therefore, it is unclear if the locks are currently functional and how the effects of sea-level rise will affect the rest of the Sacramento area. Lincoln Plaza is three miles away from this potential risk and has measures in place for flooding as described above.

Natural Infrastructure to Protect Existing Facilities

EO B-30-15 directs State agencies to prioritize the use of natural and green infrastructure solutions. Natural infrastructure is the "preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days." (Public Resource Code Section 71154(c)(3)).

Lincoln Plaza is located in an urban area where there is a scarcity of natural infrastructure. However, measures feasible for an urban area have been implemented to preserve the area's ecology. Native and adaptive plants are being incorporated in the landscaping on and around the buildings. Also, trees have been planted around the perimeter of the buildings to improve the natural ecology and mitigate high heat days. Unfortunately, there is a limit to the size and types of landscaping that can be planted due to the limited depth within the building planters and on the R Street parking deck, as well as the load factor of the garage roof's rating.

Understanding the Potential Impacts of Facilities on Communities

It is also important to recognize the impact that an infrastructure project has the surrounding community and the impacts on individual and community resilience (e.g., heat island impacts).

Vulnerable Populations

Certain populations are more susceptible to the effects of changing climate conditions, and will have less capacity to recover from changing average conditions and more frequent and severe extreme weather events. A number of factors contribute to vulnerability, often in overlapping and synergistic ways. These can include a number of social and economic factors, and be

determined by existing environmental, cultural, and institutional arrangements. Vulnerable populations can include, but are not limited to, people living in poverty; elderly; people with underlying health conditions; incarcerated populations; linguistically or socially isolated individuals; communities with less access to healthcare or educational resources; or communities that have suffered historic exclusion or neglect.

As discussed previously, CalPERS facility serves its employees as well as retirees that visit the regional office. Recently the visitors parking area was restriped to make it more apparent to the elderly and those with health and mobility issues. The Lincoln Plaza facilities are monitored for the legionella bacteria through the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 188 standard. CalPERS goes above and beyond and samples additional potential sources to ensure that vulnerable populations will not be affected by facilities operations.

Disadvantaged Communities

California is required to invest resources in disadvantaged communities (DACs). DACs are identified using CalEnviroScreeen, a tool that ranks census tracts based on combination social, economic, and environmental factors. While it does not capture all aspects of climate vulnerability, it is one tool that is available, and does include several relevant characteristics. In many cases, disadvantaged communities are more likely to suffer damage under changing climate conditions, including extreme events. The department's facilities located in these communities can contribute or alleviate the vulnerability of these communities.

Table 5, shows the CalEnviroScreen for Lincoln Plaza as 68.38. This indicates that Lincoln Plaza is not located in a disadvantaged community.

Table 5: Facilities Located in Disadvantaged Communities

Facility Name	CalEnviroScreen Score	Is it located in a disadvantaged community? Yes/No
Lincoln Plaza	68.38	No

Although Lincoln Plaza houses the Sacramento Regional Office which has a public counter for CalPERS members, it does not provide resources to the general public. The facilities support the community by reducing carbon through energy efficiency and green building practices. Lincoln Plaza has occupant health best practices in place such as scheduled maintenance of the mechanical systems on a quarterly basis. As an additional measure, indoor air quality testing is performed to ensure that the air quality meets industry best practices. Lincoln Plaza is located in an area with existing infrastructure and services which encourages active transportation and the use of public transit; which also reduces localized emissions from vehicles.

Urban Heat Islands

Urban heat islands are areas with localized spikes in temperature, which impact human health, increase pollution, and increase energy demand. Urban heat islands occur during the hot summer months in areas with higher percentages of impervious surface and less vegetation. This is likely in areas with large parking lots, dense development, and lower tree density and

shading. Urban heat islands can be mitigated (i.e., reduced) through tree planting and other greening measures, cool roofs (e.g., lighter roofing materials that reflect light), cooler pavements, and other measures.

Based on the State's Urban Health Island interactive maps, Lincoln Plaza, located in downtown Sacramento is in an urban heat island. As seen in Table 6, the facility has an urban heat island index of 6090 and is considered to be in an urban heat island.

Table 6: Facilities Located in Urban Heat Islands

Facility Name	Urban Heat Island Index
Lincoln Plaza	6090

The large underground parking structure, passive building features and landscaping mitigate the effects of the urban heat island.

Integrating Climate Change into Department Planning and Funding Programs

EO B-30-15 extends beyond infrastructure to broader planning efforts. CalPERS is aiming to have climate change adaptation integrated into the departmental planning in 2018. Climate change planning will fall under the operational expenses of the facilities.

Measuring and Tracking Progress

Changing climate conditions necessitate an adaptive management approach. An adaptive management approach is informed by tracking changing climate conditions and the performance of a plan or project. Building check points into a project or plan timeline can help to create a system for regular review and, if needed, adjustments.

CalPERS will track increases, resilience and overall progress in integrating climate change into planning and investments. The Sustainability Coordinator will oversee this monitoring, identify potential strategies and inform the Assistant Division Chief of the Operations Support Services Division who will determine feasible strategies to implement along with the Chief. The Chief will receive progress updates provided by the Sustainability Coordinator. The most concerning climate impacts are the ones that will not allow employees to continue to work in the building, such as power outages and flooding. Flooding is dependent on the infrastructure the City of Sacramento has in place. Reviewing the next update to the California Climate Action Plan will give CalPERS an update on the City's progress towards their goals.

Protecting property assets from climate change and prioritizing natural infrastructure will be key aspects of practices and initiatives. CalPERS will continue integrating climate change adaptation into existing practices. The practices for climate change adaption will create specific actions and a way to measure progress.

DEPARTMENT STAKEHOLDERS

Below is a list of individuals responsible for leading efforts related to each initiative identified in this report.

Understanding Climate Risk at Existing Facilities	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Integrating Climate Change into Department Planning and Funding Programs	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

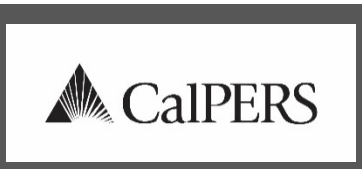
Measuring and Tracking Progress	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Zero Emission Vehicles Plan

Progress Report and Plan for Meeting
the Governor's Sustainability Goals
for California State Agencies

California Public Employees' Retirement System

Edmund G. Brown Jr., Governor



December 2017

California Public Employees' Retirement System

Sustainability Roadmap 2018-2019:

Zero Emission Vehicles

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Acronyms

EO	Executive Order
EVSE	Electric Vehicle Supply Equipment (charging equipment)
Fiscal Year	FY
GHGe	Greenhouse Gas Emissions
ICE	Internal Combustion Engine
MM	Management Memo
MPG	Miles per Gallon
SAM	State Administrative Manual
SMUD	Sacramento Municipal Utility District
ZEV	Zero Emission Vehicle

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous Executive Orders directing sustainable state operations. The orders relevant to zero emission vehicles are:

Executive Order B-18-12

Executive Order (EO) B-18-12 and the companion *Green Building Action Plan* require state agencies to reduce the environmental impacts of state operations by reducing greenhouse gas emissions, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups, the staff level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

Executive Order B-16-12

EO B-16-12 directs state agencies to integrate zero emission vehicles (ZEVs) into the state vehicle fleet. It also directs state agencies to develop the infrastructure to support increased public and private sector use of ZEVs. Specifically, it directs state agencies replacing fleet vehicles to replace at least ten percent with ZEVs, and by 2020 to purchase at least 25 percent replacement fleet as ZEVs.

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990

levels by 2050. To support these goals, this order requires numerous state agencies to develop plans and programs to reduce emissions.

2016 Zero Emission Vehicle Action Plan

The plan establishes a goal to provide electric vehicle charging to 5 percent of state owned parking spaces by 2022. It also advances the ZEV procurement target to 50 percent of light duty vehicles by 2025.

Assembly Bill 32 Scoping Plan

The scoping plan assumes widespread electrification of the transportation sector as a critical component of every scenario that leads to the mandated 40 percent reduction in greenhouse gas emissions by 2030 and 80 percent reduction by 2015.

Public Resources Code §25722.8

The Statute requires reducing consumption of petroleum products by the state fleet compared to a 2003 baseline. Mandates a 10 percent reduction or displacement by January 1, 2012 and a 20 percent reduction or displacement by January 1, 2020.

State Administrative Manual & Management Memos

The following sections of the State Administrative Manual (SAM), and associated Management Memos (MM), currently impose sustainability requirements on the department under the Governor's executive authority:

- MM 15-03: Minimum Fuel Economy Standards Policy
- MM 15-07: Diesel, Biodiesel, and Renewable Hydrocarbon Diesel Bulk Fuel Purchases
- MM 16-07: Zero-Emission Vehicle Purchasing and EVSE Infrastructure Requirements

FLEET VEHICLES

Department Mission and Fleet

This ZEV Report and Plan demonstrates to the Governor, and the public, the progress CalPERS has made toward meeting the Governor's sustainability goals related to ZEV. This report identifies successful accomplishments, ongoing efforts, outstanding challenges and future efforts.

CalPERS has fleet domiciled at the Lincoln Plaza Headquarters in Sacramento and regional offices (ROs) throughout California. The vehicles have three main uses: RO outreach, legal investigations and internal couriers.

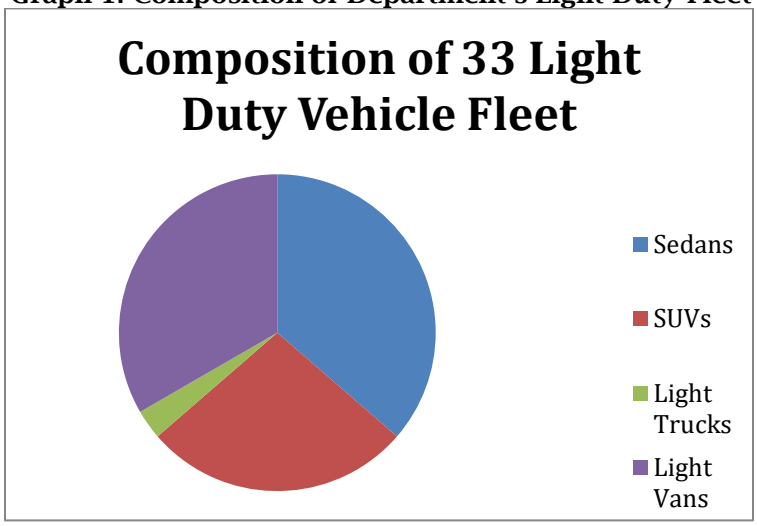
ROs utilize state vehicles to provide personal assistance to members, as well as conduct educational events throughout the state. Employees also travel among ROs to provide staffing coverage when needed. Travel varies and consists of short local trips, as well as long distance, overnight and week long trips throughout the year. The majority of travel is on highway, city streets, and at times, rural county roads.

Legal investigators travel throughout the state on a daily basis and are typically on the road for long hours conducting covert surveillance. Travel is conducted throughout the year mainly on highway and city streets.

The remaining light duty fleet consists of a messenger vehicle and cargo van utilized by the Operations Support Services Division (OSSD) located at Lincoln Plaza for short trips to deliver and pickup mail around the downtown area and West Sacramento. The cargo van is also used to pick up and deliver mail, as well as transporting office equipment between facilities. These vehicles mostly travel on city streets.

CalPERS has a variety of vehicles in its fleet. As shown in Graph 1, CalPERS has 33 light-duty vehicles; 12 sedans, 11 vans, 9 sport utility vehicles (SUVs) and 1 light duty truck.

Graph 1: Composition of Department's Light Duty Fleet



Between 2012 and 2016, the total distance traveled and the total fuel consumption has increased because RO employees and legal investigators have increased their travel in the last several years. Table 1 shows the gasoline fueled vehicles consumed 16,283 gallons in 2016, equal to a cost of $45,568, and the diesel fueled vehicle consumed 232 gallons, equal to a cost of $584. Between 2012 and 2016, the fuel economy of the fleet improved by 0.5 miles per gallon (MPG). This improvement brought up the average fuel economy of the fleet to 21 MPG.

Table 1: Total Purchased Fuel 2016

Purchased Utility	Quantity	Cost ($)
Gasoline	16,283 Gallons	$ 45,568
Diesel	232 Gallons	$ 584
TOTAL	**16,515 Gallons**	**$ 46,152**

Incorporating ZEVs into the State Fleet

A widespread shift to ZEV is essential for California to meet its greenhouse gas emission goals. State departments are now required to incorporate larger numbers of ZEVs in their fleets. Starting in Fiscal Year (FY) 2017/2018 the percentage of new light duty vehicles that must be ZEV will increase by five each year, reaching 25 percent in FY 2019/2020 and 50 percent in FY 2024/2025. The ZEV Hybrid First Fleet Purchasing Policy has been implemented to aid this widespread shift. This policy ranks vehicles in order of purchasing preference: pure ZEV (including battery electric and fuel cell vehicles), plug-in hybrid; hybrid-electric (as well as alternative fuel vehicles), and internal combustion engines (ICE) vehicles.

A significant portion, 19 out of 33 vehicles, or 58 percent of CalPERS' fleet, is domiciled at the ROs across California. RO vehicles currently consist of nine ICE sedans, five ICE SUVs, two ICE minivans (one lease), two hybrid sedans and one hybrid SUV. These vehicles are used for local and long distance travel to provide service to members. While CalPERS understands the

importance of incorporating ZEVs into the fleet, ZEVs are not a feasible option for the ROs. Pure battery electric vehicles (BEV) do not offer the range required for RO travel. Also, travel for appointments are conducted in residential areas where refueling infrastructure is unpredictable. Without sufficient infrastructure at these facilities, fleet will not be able to efficiently utilize plug-in hybrid vehicles (PHEV). While hydrogen fuel cell electric vehicles (FCEV) do offer longer mileage range, there is not a sufficient number of hydrogen fuel stations across the state. RO vehicles travel to cities such as, Crescent City *(approximately 750 miles round-trip)*, Eureka *(600 mi.)*, Bishop *(500 mi.)*, Blythe *(350 mi.)* and Redding *(350 mi.)*. There are currently no existing hydrogen stations along those routes. Therefore, hybrid electric vehicles will best fit the needs of the ROs. Currently, 17 out of 19 vehicles meet replacement thresholds and will be replaced with hybrids. It is estimated two to three vehicles will be replaced per FY.

12 out of 33 vehicles, or 36 percent of CalPERS' fleet, is assigned to the Legal Investigation Unit. These vehicles have very specific needs and are exempt from ZEV purchasing through the Public Safety Exemption. However, CalPERS has evaluated ZEV options to see if any could be incorporated into investigations fleet. Unfortunately, BEVs do not offer the range required for travel. FCEVs and PHEVs are not available in vehicle classes, minivans and full-size SUVs, required to meet investigations specifications, such as an area to conceal themselves during surveillance and cargo space for videotaping. Hybrid vehicles are available in select SUVs, however, there are no current hybrid options for minivans, which make up 67 percent of investigations fleet. Currently, 7 out of 12 vehicles meet replacement thresholds. CalPERS anticipates that five vehicles will be replaced in FY 2017/2018, the remaining two in FY 2018/2019 and 2019/2020. At this time, all seven vehicles will be replaced with ICE minivans, however, hybrid vehicles will be incorporated when feasible.

The remaining 2 out of the 33 vehicles, or six percent of CalPERS' fleet, is assigned to OSSD. This consists of the messenger vehicle and cargo van. The messenger vehicle that is leased through DGS was recently replaced with a BEV. There are no ZEV options available for cargo vans, however, alternative fuel (CNG) cargo vans could be utilized for this role. The cargo van currently meets the age replacement threshold and will be replaced within the next five years. The CNG and ZEV options, if available, will be considered at time of replacement.

Vehicles over specified mileage and age thresholds are eligible for replacement. Currently, there are 24 vehicles eligible for replacement. Vehicles consist of nine midsize sedans, nine SUVs, one light-truck, five minivans and one cargo van. Table 2, below, illustrates the number of light-duty vehicles currently eligible for replacement.

Table 2: Vehicles in Department Fleet Currently Eligible for Replacement

	Midsize Sedan	SUV	Light Truck	Mini Van	Cargo Van	Total
# of OWNED vehicles eligible for replacement	9	9	1	4	1	24
# of LEASED vehicles eligible for replacement	0	0	0	1	0	1

CalPERS was able to integrate its first pure battery electric vehicle into fleet. This was accomplished by replacing the leased messenger minivan with a zero emissions sedan, as illustrated in Table 3. CalPERS currently has no plans of expanding its light-duty fleet in the near future.

Table 3: ZEV Additions to the Department Fleet

Table Header Format	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22
Battery Electric Vehicle	0	0	0	1	0	0	0	0
Plug-in Hybrid Vehicle	0	0	0	0	0	0	0	0
Fuel Cell Vehicle	0	0	0	0	0	0	0	0
Percent of total purchases	0%	0%	0%	13%	0%	0%	0%	0%
Required ZEV Percentage	10%	10%	10%	15%	20%	25%	30%	35%
Total number of ZEVs in Fleet	0	0	0	1	1	1	1	1

The ZEV/Hybrid first requirement will greatly impact the needs of CalPERS fleet. Due to the limitation, such as, scope of work, duration of travel, insufficient vehicles types, and insufficient electric and hydrogen refueling infrastructure throughout the state, CalPERS has limited ability to integrate ZEVs into fleet. Hybrid vehicles are offered in the majority vehicle classes and will be the most feasible option for CalPERS. As the green fleet initiative continues, review of ZEV options, and the support to efficiently sustain those vehicles, will expand.

Telematics Plan

Telematics is a method for monitoring vehicle use. Using GPS and on-board diagnostics, telematics provides valuable information that often results in fuel savings and improved vehicle utilization. Telematics is especially important for verifying that PHEVs are maximizing the use

of electric fuel rather than gasoline. The rule requiring 50 percent of ZEVs purchased to be BEVs is not in place for fleets making use of telematics for all ZEVs.

Currently, CalPERS has one pure ZEV in fleet, with no additional foreseen ZEV purchases in the near future. Therefore, no immediate need or plan in place to integrate telematics into fleet.

Public Safety Exemption

CalPERS Legal Investigations Unit consist of 12 out of 33 vehicles. For vehicles to remain exempt from the ZEV purchasing mandate, they must meet certain criteria as outlined in MM 16-07. Investigators have peace officer status pursuant to Penal Code Section 830.3(h), and are Authorized Emergency Vehicles as defined in California Vehicle Code 165(b)(1). Although emergency response is not the primary purpose of the vehicles, CalPERS Legal Division agrees that vehicles may be used as part of an emergency response mutual aid effort.

Vehicle size, handling and performance are critical for the Investigations Unit. Vehicles are used for undercover surveillance and as follow vehicles to identify potential violations of disability fraud. It is essential for vehicles to provide a large cargo area to meet the spatial capacity needed for equipment and videotaping. Additionally, vehicles must provide investigators space to conceal themselves if ever approached during surveillance, as well as provide sufficient accommodations since Investigators are required to sit for long periods of time.

Due to the specific needs of the Investigations Unit, current ZEV options are not feasible. Battery electric vehicles do not offer the electric range required for travel, nor do they offer suitable vehicle classes, minivan and full-size SUV. FCEV also do not offer suitable vehicle classes. Additionally, hydrogen refueling stations are extremely limited in the regions traveled, causing concern at the possibility of a vehicle becoming stranded while in the field. PHEV options are also limited and not available in vehicle classes required to meet investigation's needs. There are non-plug-in hybrid electric vehicles available in select SUV models. While hybrids can be integrated into fleet, 67 percent of Investigations fleet consist of minivans, currently not available in ZEVs or hybrids. As manufacturers expand ZEV options, CalPERS will evaluate the possibly of integrating those into fleet. Meanwhile, CalPERS will continue to request a public safety exemption for investigations vehicles when submitting its annual Fleet Acquisition Plan.

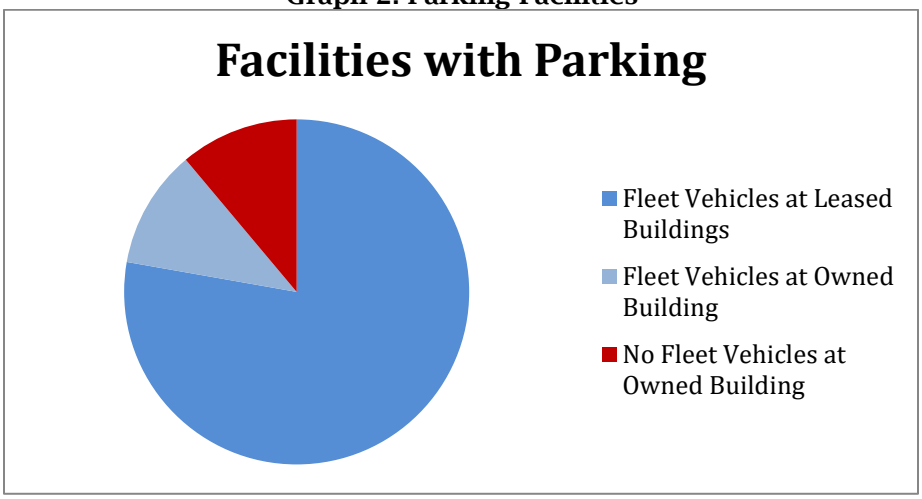
ZEV INFRASTRUCTURE

Introduction to the California Public Employees' Retirement System Parking Facilities

CalPERS has two types of facilities, the owned Headquarters properties and the leased ROs. At Lincoln Plaza, there are three buildings and two garages. LPN and LPEW garages are connected and provide parking spaces for fleet, employee, and visitor vehicles in distinct sections of the garage. LPS has a separate parking garage located at 500 R Street which is used for employee vehicles and the general public. Parking at the ROs varies by location. At each RO, CalPERS occupies a small amount of office space and is considered a small tenant in a large facility. At a minimum, there are enough parking spaces provided for employees, visitors and the CalPERS vehicles domiciled at each RO.

Graph 2 shows the breakdown of the different types of parking facilities. Seven out of the nine leased facilities, at the ROs, have fleet vehicles located in the parking facilities. At the one facility that is owned by CalPERS, the LPN and LPEW garages, there are fleet vehicles in their facilities. The final facility owned by CalPERS, 500 R Street garage, does not host fleet vehicles.

Graph 2: Parking Facilities



Along with the ZEV fleet procurement requirements, as mentioned in the previous section, MM 16-07 requires state agencies to designate five percent of all parking spaces for Electric Vehicle Supply Equipment (EVSE) through FY 2020/2021. Given the nature of CalPERS' Lincoln Plaza fleet operations and the length of stay for visitors and employees, DGS recommends 75 percent Level 1 and 25 percent Level 2 ratio of charging stations as appropriate for owned facilities. The charging stations will be available for fleet, employee and visitor use.

Based on the requirements of MM-16-07, CalPERS will need to install an additional 71 Level 1 and four Level 2 chargers to join the existing 20 Level 2 EVSE in LPN, LPEW and 500 R Street parking facilities for a total of 95 EVSE onsite, see Table 4.

LPN and LPEW have a total of 1,377 parking spaces with 13 Level 2 chargers. The 500 R Street garage contains 528 parking spaces with seven Level 2 chargers. To comply with MM 16-07, LPN and LPEW will need an additional 52 Level 1 and four Level 2 chargers and 500 R Street garage will need an additional 19 Level 1 chargers.

LPN and LPEW garages have the highest priority for installation of additional EVSE chargers. The 13 existing Level 2 chargers had peak occupancy of 85 percent in 2016. This indicates that at any one-time there are only two stations available. CalPERS is currently assessing the feasibility of additional EVSE at this location and will take a phased installation approach over the next four years.

Table 4: High Priority EVSE Projects

Facility Name	Total Parking Spaces	Existing L1 Chargers	Existing L2 Chargers	New L1 Chargers Needed	New L2 Chargers Needed
Lincoln Plaza North & East/West	1377	0	13	52	4
500 R St.	528	0	7	19	0
Total	1905	0	20	71	4

EVSE Construction Plan

The CalPERS property management team is currently working with an engineering consultant to perform a feasibility study and design to expand existing infrastructure at LPN and LPEW garages. This study will evaluate the accessibility of existing EVSE, identify potential additional charging locations for handicapped EVSE parking and identify locations for the remaining Level 1 and Level 2 EVSE. CalPERS' current plan is to complete the designs for Level 1 and Level 2 in 2017. This will allow CalPERS to budget the installation of the Level 1 and Level 2 EVSE in phases. The property management team will be responsible for the bid, construction and activation of the EVSE.

Outside Funding Sources for EV Infrastructure

As mentioned above, CalPERS is currently undergoing a design study to add additional Level 1 and Level 2 chargers in LPN and LPEW garages. A private company installed the existing EVSE at Lincoln Plaza and will install the additional charging units. CalPERS is considering a partnership with Sacramento Municipal Utility District (SMUD) to fund the additional Level 2 charging stations at Lincoln Plaza. SMUD is currently offering a $1,500 per charging head rebate and CalPERS has encouraged SMUD to develop a similar rebate for Level 1 chargers.

Hydrogen Fueling Infrastructure

FCEVs are not feasible for the CalPERS fleet as discussed previously. Therefore, CalPERS does not have current plans to install hydrogen fueling infrastructure at its facilities.

Comprehensive Facility Site and Infrastructure Assessments

Site Assessments are performed to establish the cost and feasibility of installing needed EV infrastructure. Table 5 lists the facilities that have been evaluated with Site Assessments.

The Five-Year ZEV Infrastructure Readiness Survey was completed in February 2017, to determine the ability of CalPERS to support 5 percent workplace charging and ZEV fleet integration through FY 2020/2021. Based on the survey, CalPERS is targeting the facilities below in Table 5 for additional EVSE following a 25 percent Level 2 to 75 percent Level 1 EVSE ratio. LPNEW currently has 13 Level 2 charging stations, which cost approximately $242,000, and put in place additional EVSE panel infrastructure for future installations. There are plans to add four more Level 2 charging stations and 52 Level 1 stations in LPNEW. LPS parking garage has seven Level 2 charging stations, which had an associated project cost of $49,000. LPS will need to install 19 Level 1 stations to be compliant.

Table 5: Results of Site Assessments

Facility Name	L1 Chargers with Current Electrical System	L2 Chargers with Current Electrical System	Total cost for Project using Current Electrical System	L1 Chargers with Electrical System Upgrades	L2 Chargers with Electrical System Upgrades
LPNEW	1	13	$242,000	52	4
LPS	0	7	$49,000	19	0
Total	0	20	$291,000	71	4

EVSE Operation

Lincoln Plaza currently utilizes Level 2 EVSE by Chargepoint. These units are available for employees, visitors and fleet to use in preferred locations. Users setup a free Chargepoint account to access the EVSE. CalPERS has an energy cost recovery policy in place for the Lincoln Plaza chargers. The electricity costs that CalPERS pays are passed on to the EVSE users through the users Chargepoint account. This is fairly inexpensive and averages approximately $0.12 per kilowatt hour.

Chargepoint provides many services for managing the stations online. Using the Chargepoint software, CalPERS is able to determine how many stations are in use, real-time, run a multitude of reports and change the pricing policy. The EVSE equipment is maintained by the property management team.

Lincoln Plaza currently has all Level 2 EVSE and a four-hour charging limit posted at each station. Based on the 2016 user data from Chargepoint, the average session length, regardless of actual charging time, is three hours and 40 minutes. Further analysis found that 62 percent of all EVSE users had a session less than four hours. This shows that the majority of the users are moving their vehicles after the four-hour period. In 2016, even at peak occupancy, there

were always at least two EVSE available for use. If the peak occupancy does reach 100 percent, a fee may be implemented through Chargepoint to encourage users to move their ZEV after the four-hour period. This fee would be implemented to increase the availability of EVSE stations.

CalPERS is researching the feasibility of implementing a Level 1 charging program for employees as well as fleet. This program would allow employees to bring their own charging cable and pay a flat monthly rate that gives them access to charge their vehicles all day. This program has the advantage of not requiring the employee to move their vehicles after four hours, unlike the Level 2 charging. This system would be less sophisticated than the Chargepoint system, but would still be metered in groups, allowing the amount of electricity utilized by the Level 1 EVSE to be tracked. This equipment would also be maintained by the property management team.

Overall, CalPERS has been proactive in encouraging clean transportation by integrating zero emissions vehicle into fleet and installing additional electric vehicle charging stations for employees and visitor usage. CalPERS looks forward to continuing its compliance with green building best practices and support of the green technology industry.

DEPARTMENT STAKEHOLDERS

List individuals, offices, and divisions responsible for leading efforts related to each initiative identified in this report. Include their respective titles, roles, responsibilities.

Incorporating ZEVs Into the Department Fleet	
Individual or division name	Title, role, responsibilities, managers, etc.
OFAM	Kelly Young, Fleet Coordinator

Public Safety Exemption	
Individual or division name	Title, role, responsibilities, managers, etc.
OFAM	Kelly Young, Fleet Coordinator

Outside Funding Sources for ZEV Infrastructure	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Comprehensive Facility Site and Infrastructure Assessments	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

EVSE Construction Plan	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

EVSE Operation	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Energy Plan

Progress Report and Plan Update
on Meeting the Governor's Sustainability Goals
for State Departments

California Public Employees' Retirement System
Edmund G. Brown Jr., Governor

December 2017

California Public Employees' Retirement System

Sustainability Roadmap 2018-2019:

Energy

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Acronyms

ADR	Automated Demand Response
CA	California
CALGREEN	California Green Building Code (Title 24, Part 11)
CalPERS	California Public Employees' Retirement System
CEC	California Energy Commission
DGS	Department of General Services
EMS	Energy Management System (a.k.a., EMCS)
EMCS	Energy Management Control System (a.k.a., EMS)
EO	Executive Order
EPP	Environmentally Preferable Purchasing
EUI	Energy Use Intensity (kBtu/sq. ft.)
EVSE	Electric Vehicle Supply Equipment (charging equipment)
GHGe	Greenhouse Gas Emissions
HVAC	Heating, Ventilation, and Air Conditioning
IEQ	Indoor Environmental Quality
IT	Information Technology
kBtu	Thousand British Thermal Units (unit of energy)
kBtu/ft2	kBtu per square foot
kWh	Kilowatt-hour
LEED	Leadership in Energy and Environmental Design
LPEW	Lincoln Plaza East-West
LPN	Lincoln Plaza North
LPS	Lincoln Plaza South
MBCx	Monitoring Based Building Commissioning
MM	Management Memo
OBF	On-Bill Financing
PPA	Power Purchase Agreement
PUE	Power Usage Effectiveness
SAM	State Administrative Manual
SCM	State Contracting Manual
SMUD	Sacramento Municipal Utility District
ZEV	Zero Emission Vehicle
ZNE	Zero Net Energy

SUSTAINABILITY GOALS

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The Governor has issued numerous Executive Orders directing sustainable state operations. The orders relevant to energy are:

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Executive Orders (EO) B-18-12 and the companion *Green Building Action Plan* require state agencies to reduce the environmental impacts of state operations by reducing greenhouse gas emissions, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups; the staff level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

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State Administrative Manual & Management Memos

The following sections of the State Administrative Manual (SAM), and associated Management Memos (MM), currently impose sustainability requirements on the Department under the Governor's executive authority:

- SAM Chapter 1800: Sustainability
- MM 15-06: State Buildings and Grounds Maintenance and Operation
- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 15-03: Minimum Fuel Economy Standards Policy
- MM 14-05: Indoor Environmental Quality: New, Renovated, And Existing Buildings
- MM 14-07: Standard Operating Procedures For Energy Management In State Buildings
- MM 14-09: Energy Efficiency in Data Centers and Server Rooms

ENERGY REPORT

This Energy Report demonstrates to the Governor's Office, and the public, the progress CalPERS has made toward meeting the Governor's sustainability goals related to energy. This report identifies successful accomplishments, ongoing efforts, and outstanding challenges.

Department Mission and Built Infrastructure

CalPERS' mission is to: "Provide responsible and efficient stewardship of the System to deliver promised retirement and health benefits, while promoting wellness and retirement security for members and beneficiaries." This sentiment is extended to the management of assets such as the headquarters buildings at Lincoln Plaza. CalPERS has a long standing history of implementing energy efficiency measures and has performed several studies to evaluate new technology to maximize and maintain the building's efficiency. Energy efficiency has been an evolving process over the lifetime of these buildings and EO B-18-12 provides CalPERS with clear goals to achieve.

Lincoln Plaza consists of three buildings, Lincoln Plaza North (LPN) built in 1986, Lincoln Plaza East-West (LPEW), built in 2006 and Lincoln Plaza South (LPS), built in 1988. Although built in 1988, LPS was not occupied by CalPERS until 2012. These high-performing buildings have a combined square footage of approximately 1.2 million square feet (sq. ft.) of Class A office space and feature a Trade Room, a 13,000 sq. ft. data center and a print room. These facilities combined, support over 2,000 onsite team members, offering an onsite coffee shop, sandwich shop, café, gym, sundry shop and child care facility.

The Lincoln Plaza campus utilizes both electricity and natural gas. Table 1, contains the total quantity and cost of grid-based energy used onsite. Electricity is the predominate form of energy utilized. In 2016, Lincoln Plaza used 20.2 million kilowatt hours (kWh) at a cost of approximately $2.5 million. This amounts to an average cost of $0.12/kWh. Natural gas is used mainly for hot water heating in the buildings and heat during the winter months. In 2016, approximately 80,000 therms were used costing approximately $80,000. This amounts to an average cost of $1.00/therm. The total energy usage of Lincoln Plaza amounts to approximately 77 million kilo British thermal units (kBtu) and $2.6 million.

Table 1: Total Purchased Grid-Based Energy 2016

Purchased Utility	Quantity	Cost ($)
Electricity	20,239,484 kWh	$2,507,960
Natural Gas	79,602 Therms	$79,443
TOTAL	**77,039,669 kBtu**	**$2,587,403**

Lincoln Plaza can also be examined by the amount of energy consumed per building. Site energy refers to the energy utilized at each site. The site energy per building is shown in the third column of Table 2. Source energy accounts for the amount of energy that is used to create and distribute energy, also known as losses, and for the energy used by the site. Source energy is

therefore higher than the site energy. Energy use intensity (EUI) is the ratio of energy to the area of a building and normally has the units of kBtu per square foot (kBtu/ft2). The source EUI of the buildings is in the last column of Table 2. LPEW has the highest source EUI of 215; it is also the largest building with the most energy use, partially due to the fact that it houses the data center. LPN has the next highest source EUI of 161 followed by LPS with a Source EUI of 126 kBtu/ft2.

Table 2: Source Energy Use Intensity 2016 by Property

Building Name	Floor Area (ft^2)	Site Energy (kBtu)	Source EUI ($kBtu/ft^2$-yr)
Lincoln Plaza East-West	538,162	40,792,817	215
Lincoln Plaza North	505,098	27,087,376	161
Lincoln Plaza South	226,522	9,159,477	126
Total for All Department Buildings	1,269,782	77,039,669	177

CalPERS has had specific challenges with the baseline requirement for the EO B-18-12 energy goals for both grid-based reduction and the 50 percent ZNE source reduction, which stems from the overall square footage growth after the baseline year. CalPERS is currently looking into potential solutions to this issue through energy efficiency projects and forms of renewable energy. This will be discussed further in the upcoming sections.

As a leader in sustainable practices and through its commitment to preserving our state's natural resources, CalPERS makes significant efforts to reduce the impact on the environment by implementing and promoting the Governor's sustainability goals. Every year, CalPERS reports their progress to the Board of Administration through the Annual Operational Sustainability Report. This document publicly highlights the collaborative efforts to meet and exceed these aggressive sustainability standards to green the state's buildings. In addition, CalPERS has a Green Building Accomplishments and Initiatives page on its website. This page highlights CalPERS' sustainable accomplishments and recognition for its leadership and commitment to a sustainable environment.

In 2016, the Association of Energy Engineers presented CalPERS with the Association of Energy Engineers Sustainability Award. This award was given for CalPERS' continuous improvement in energy reduction as well as their leadership in sustainability and innovative energy management practices.

The latest capital improvement plan (CIP) from Fiscal Year (FY) 2015/2016 outlines the project and construction management activities for the next five years. There are several projects that will improve energy efficiency. These projects will be designed and contracted through the property management team. LPN has several efficiency projects in progress, which include the first-floor tenant improvement and rooftop damper upgrades. The first-floor tenant improvement includes important electrical and heating, ventilation and air conditioning (HVAC) infrastructure upgrades; some of which improve energy efficiency. The rooftop damper upgrades will replace the original dampers, after, LPN and LPEW facilities will be retro-commissioned during FY 2017/2018.

Reduce Grid-Based Energy Purchased by 20% by 2018

EO B-18-12 requires state agencies to reduce grid-based energy purchases by 20 percent by 2018, compared to the 2003 baseline. This Order has provided a challenge for CalPERS because the campus has more than doubled in size since the 2003 baseline due to adding LPEW and LPS to Lincoln Plaza Headquarters.

As currently written, EO B-18-12 requires that "State agencies continue taking measures to reduce grid-based energy purchases for State-owned buildings by at least 20 percent by 2018, as compared to a 2003 baseline." In 2003, CalPERS consisted of only one building, LPN. Since that time CalPERS has increased its total area by 62 percent. In 2016, Lincoln Plaza North saved 40 percent in grid-based energy purchases over the 2003 baseline, exceeding the 2018 goal by almost double the required amount. However, the Sustainable Buildings website reflects that CalPERS increased its energy consumption by 71 percent. This percentage increase is due to the addition of LPEW and LPS which are not taken into consideration in the baseline.

Following this logic, to be in compliance, LPN must reduce its energy by an additional 20 percent, and the two newly added buildings would need to have energy consumption equal to zero. There are also similar implications with the 50 percent ZNE Source reduction goal. The requirements for this Order may be a challenge to meet, however, CalPERS will continue to implement energy efficiency measures throughout the facilities and evaluate renewable energy options.

CalPERS has increased the total building area from the baseline of 505,098 square feet in 2003 to approximately 1.2 million sq. ft. The total site energy consumption has increased from 45 million kBtu in 2003 to 77 million kBtu in 2016. In reviewing the total site energy and average site energy use intensity (EUI), which measures energy per square foot, from 2012 to 2016, the values of both have reduced, indicating energy savings and increased efficiency. The average site EUI for the 2003 baseline is 89 kBtu/ft^2per year. In 2016, the site EUI is 61 kBtu/ft^2per year. The site EUI has improved by 32 percent over the baseline; however the total energy use has increased by 71 percent.

Table 3: Department Wide Energy Trends

Year	Building Area (ft^2)	Total Site Energy (kBtu)	Average Site EUI ($kBtu/ft^2$-yr)
Baseline Year	505,098	44,951,294	89
2012	1,465,818	102,794,399	70
2013	1,465,818	97,100,526	66
2014	1,465,818	87,325,260	60
2015	1,269,782	79,696,428	63
2016	1,269,782	77,039,669	61
2018 Goal	1,269,782	35,961,035	28

While CalPERS has significantly reduced its energy use, (19 million kBtu since 2012, not including the energy from the building vacated in 2014) resulting in a 20 percent energy reduction in just five years. Given the requirements stated in the mandate, CalPERS will continue to look for ways to reduce its usage to meet the 20 percent reduction by 2018 goal.

The one building that existed in 2003, LPN, reduced its energy consumption by 40 percent in 2016, thereby exceeding the Governor's Orders of a 20 percent reduction. LPEW did not exist in 2003 and therefore is not able to be measured against a 2003 baseline. LPS was purchased by CalPERS in 2012 and the 2003 baseline information is not available.

Energy Efficiency Measures

There are numerous Management Memos and sections of the State Administrative Manual (SAM) that provide specific direction and support for the state's energy efficiency goals. Below is a discussion of these items and how they have been implemented, or plans for future adoption. These can be divided into four main categories: base building equipment, data center, plug load equipment and outreach.

The main base building equipment consists of the HVAC, boilers and lighting systems. The heating, ventilation and air conditioning (HVAC) system is controlled by the building management control system (BMCS). The BMCS is set to minimize HVAC electric usage outside of normal operating hours by being set to run from 7:00a.m. to 6:00p.m. The BMCS is set to allow for a +/-2 degree fluctuation or greater from the HVAC temperature setpoint for all systems. The HVAC ducts, filters and equipment are inspected and maintained to maximum effectiveness. Reoccurring semiannual maintenance is scheduled to ensure the maintenance is performed on schedule. Via retro-commissioning, the property management team is currently looking into energy saving measures such as the functionality and feasibility of a night flush cycle, optimal start up, night set back, load shedding, boiler and chiller lockout, and Sequence

of Operations. The BMCS functionality allows the property management team to test energy saving strategies and determine if certain measures will increase energy efficiency.

Low pressure, low temperature boilers are another base building system that are used to heat the buildings for comfort. The boilers are serviced twice a year, including a combustion efficiency check. The annual maintenance is performed by the manufacturer and the semiannual maintenance is conducted by the property management team. The boilers are only used during the cold winter months to heat the buildings. Hot water heaters are used for domestic purposes such as handwashing and in the kitchenettes. All of the domestic hot water heaters are currently set to 140 degrees Fahrenheit, which is higher than the recommended 105°F. This is because the Occupational Safety and Health Administration (OSHA) requires that domestic hot water heaters be maintained at 140 degrees Fahrenheit to control the growth of microorganisms. LPN is currently transitioning to more efficient, programmable domestic hot water heaters.

The lighting systems are controlled through independent lighting panels. Incandescent light bulbs and magnetic florescent ballasts are not used onsite. Lights are minimized outside of normal building hours and seasonally during business hours when natural ambient lighting is high. Additionally, the panels perform daylighting along the windows near the perimeter of the buildings for LPN and LPEW. Daylighting is taken one step further in LPEW with automatic shades that move up and down throughout the day to provide daylight without glare. Lights in unoccupied private offices and conference rooms are controlled by occupancy sensors. The property management team follows the light levels set forth by the Illumination Engineering Society (IES).

The CalPERS data center is approximately 13,000 sq. ft. and is located in LPEW. This data center is operated in accordance with Management Memo 14-09 (MM 14-09): “Energy Efficiency in Data Centers and Server Rooms.” MM 14-09 requires all data centers over 1,000 square feet to report their power usage effectiveness (PUE). PUE is the ratio of total facility energy divided by the Information Technology (IT) equipment energy. PUE indicates how much energy is used for cooling systems, power delivery, IT equipment and lighting per every kWh of energy used for IT Equipment. CalPERS measures the PUE through building sub-meters in 15 minute intervals via the BMCS.

CalPERS has implemented many voluntary energy efficiency measures in the data center. Hot aisle containment curtains create a barrier to separate cool supply air from warm discharge air in the equipment row where the cool air from the raised floor plenum is induced through the equipment and pulled into the hot aisle for return to the cooling units. This efficiency measure is used in conjunction with floor grommets and blanking plates in the equipment racks to further separate the cold and hot air. A mechanical consultant works closely with the data center team to simulate the data center airflow and determine the appropriate number and location of perforated tiles. Underfloor cooling is managed to evenly distribute the cool air where needed, it is reevaluated and adjusted if needed every time a new piece of equipment is installed. In 2017, temperature sensor arrays were installed throughout the data center, which allows the team to verify the simulation with real time data.

MM 14-09 also states, “All state owned and leased data centers and server rooms greater than 200 sq. ft. must be operated within the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)-TC 9.9, Class A1-A4 guidelines, including operating at temperatures between 73-81 degrees Fahrenheit.” The operating room temperature of the data center is not currently known as the cooling equipment is run based on an underfloor temperature setpoint. With the addition of temperature sensor arrays, the operating temperature will now be known and tracked. The temperature sensor arrays are located per ASHRAE Standards throughout the data center, favoring equipment with lower maximum temperatures as allowed by the manufacturer. The temperature sensors will allow the property management team to monitor the temperature of the more sensitive equipment as the temperature is raised to further improve efficiency.

All network switches and routers purchased since 2014 meet the Energy Efficient Ethernet Institute of Electrical and Electronics Engineers (IEEE) 802.3-2012 Section 6 standard as set forth by MM 14-09.

There are several plug load devices throughout the facilities. Computers, monitors, copiers, printers and scanners are the largest category of plug-in devices. They are all set to utilize the built-in energy saving mode during periods of inactivity. Over 90 percent of devices switch to energy saver mode after 30 minutes of inactivity. CalPERS team members are aware that personal electronic appliances are prohibited with exception of cell phones and tablets. Employees are reminded of this requirement on CalPERS’ internal Sustainable Operations Page. Team members can submit a reasonable accommodation request for a standard heater or fan, and if approved, a fan or heater is provided. Quarterly audits are performed to identify and remove unauthorized devices.

The equipment for the breakrooms is purchased by the property management team including refrigerators, freezers, coffee makers, and ice machines. The vending machines are provided by the Department of Rehabilitation. Energy Star label equipment is always considered first when purchasing new appliances. The maintenance and cleaning of the breakroom refrigerators, freezers and ice machines are all performed by the property management team. The majority of the refrigerators are newer than 2000. If there are any refrigerators manufactured before 2000 they will be replaced at end of life with new energy efficient models. CalPERS purchases coffee makers that shut off automatically to conserve energy. All vending machines are on energy saving motion detectors with the exception of frozen food machines. The majority of the vending machines onsite are certified Energy Star equipment and the machines that are not will be replaced at end of life. Approximately half of the vending machines are non-refrigerated and the other half are refrigerated with the exception of a couple of frozen food machines.

Outreach activities allow the building management team to communicate with the CalPERS team members. CalPERS’ main employee engagement efforts consist of an internal sustainability page which provides sustainable best practices, the quarterly Sustainability Committee meetings and sustainability events throughout the year.

The internal sustainability page also contains office space guidelines such as authorized device policies and reminds team members to turn off task lights and unplug personal devices when

they are not in use. Further, it educates employees on the appropriate energy savings settings that are enabled on all equipment. Additionally, CalPERS sends out an annual email to remind team members about seasonal energy efficiency measures that are in place such as half lighting in circulation areas, the potential of SMUD demand response events and the minimization of after-hours HVAC requests. This email will be expanded next year to educate all employees on the importance of minimizing electrical plug loads. Sustainability events occur throughout the year to support CalPERS' sustainability efforts, such as, the Earth Month educational activities.

ASHRAE Level 1 and Level 2 energy audits were performed for all three buildings within the last five years. Table 4 indicates that the energy audits for LPN and LPEW were performed in 2013 and LPS in 2014. These surveys helped identify energy efficiency measures for each of the facilities. All of the no-cost, low-cost and demand measures found were enacted.

Table 4: Energy Surveys

Year	Total Department Floor Area (ft^2)	Energy Surveys (ft^2)		Percent of Department Floor Area (ft^2)	
		Level 1	Level 2	Level 1	Level 2
2013	1,269,782	1,043,260	1,043,260	82%	82%
2014	1,269,782	226,522	226,522	18%	18%

CalPERS has three ways that energy projects are budgeted for: tenant improvements, end of life upgrades and energy efficiency plus projects.

Tenant improvement projects are performed when employees are moved to a new location, and there is an opportunity to work on the unoccupied area of the building. Operationally, this allows the property management team to perform systematic building upgrades on an area, such as updating HVAC controls for improved efficiency. This has been a multi-year project in LPN since 2012 and upgrades will continue through 2018.

End of life upgrades are planned when a building component is near end of life. CalPERS uses the life cycle cost analysis when evaluating any equipment replacement. Near end of life, a study is performed to determine an appropriate replacement. This analysis looks at available equipment on the market, and determines which would be most efficient and cost effective. An example of this is the conversion of the LPN data center to an Intermediate Distribution Frame (IDF) closet, as seen in Table 5. When a study was performed to review the uninterruptable power supply equipment loads at end of life to size new equipment, it was found that the load was so small that it would be more efficient to migrate all of the data center equipment to the LPW data center and turn the LPN data center into an IDF closet. While performing an end of life analysis, it was determined that an even more energy efficient option was available. Further examples of this project type are the 2015 LPS Exterior Lighting Upgrade to light-emitting diode (LED) and the 2017 LPN rooftop damper upgrade.

Energy efficiency plus projects are projects that are put in place because they save energy and improve another aspect of the building. At Lincoln Plaza, the electricity is supplied by SMUD and the cost is very inexpensive; around $0.13/kWh. This makes it very hard for even the most simple energy efficiency projects, such as lighting conversion to LED, to pay back. To

compensate for this, the property management team has started to look for energy savings in other needed upgrades, such as reoccurring maintenance items and life safety technology. Projects that are solely for the sake of energy efficiency are still performed, if financially feasible. Due to the inexpensive energy costs and the high performance of the buildings, identifying projects can be difficult. Examples of difficult projects selected include the 2012 LPEW central plant improvements, 2015 LPEW data center hot aisle containment and the planned 2017 LPN/LPEW building retro-commissioning.

Table 5: Summary of Energy Projects Completed or In Progress

Year Funded	Energy Project	Floor Area Retrofit (ft^2)	Percent of Department Floor Area
2012	LPEW central plant improvements	538,162	42%
2015	LPEW data center hot aisle containment	13,000	1%
2015	LPS exterior lighting upgrade to LED	226,522	18%
2016	LPN data center decommissioning	6,600	1%
2017	LPN rooftop damper upgrade	505,098	40%
2017	LPN/LPEW building retro-commissioning	1,043,260	82%

The Lincoln Plaza facilities are constantly changing and becoming more efficient through projects and through small changes that the property management team makes through studying the building systems. Since 2012, LPN, LPEW and LPS have saved 19 million kBtu or 20 percent of the total energy through energy efficiency measures and projects.

Renewable Energy

New or major renovated state buildings over 10,000 square feet must use clean, onsite power generation, and clean back-up power supplies, if economically feasible. Facilities with available open land must consider large scale distributed generation through various financing methods, including, but not limited to, third-party Power Purchase Agreements (PPAs).

Although there are no specific kW goals for renewable energy, renewable energy does count towards meeting: (1) 20 percent grid based energy use reduction by 2018 and; (2) Zero Net Energy goal by 2025.

In 2015, CalPERS performed a solar feasibility study for LPS and the adjacent parking structure to determine if adding solar on the building level would be cost effective. The study results showed the project would not be cost effective, with a 19-year simple payback and a return on investment of 14 years assuming a 2.5 percent utility increase. The project would cost roughly $0.17/kWh over the next 25 years; whereas the cumulative average energy cost for the building and structure for 2016 was $0.13/kwh.

The findings in the study were extrapolated to include all three buildings to determine the amount of onsite energy generation that would be required for site 50 percent ZNE. Extrapolating the study from LPS to the campus, over 500,000 square feet of solar panels would be needed, costing approximately $58 million. The campus approach, much like the building approach, would not be cost effective nor does the campus have enough usable space to add the requisite amount of solar panels.

After determining that onsite solar was not feasible for the site, CalPERS entered into an agreement for 8.7 million kWh/year of community solar through SMUD. This program, SolarShares, will provide LPN and LPEW with approximately 50 percent of their energy from a local solar farm. This agreement means that 82 percent of the headquarters total area will be participating in a renewable energy program. This program will save CalPERS $3.7 million over the 20 years of the agreement, with no upfront costs. A similar agreement will be evaluated for LPS. Additional benefits of this program include a set amount of delivered energy, not subject to panel degradation or weather variation, and no need for maintenance or repairs as required by onsite solar.

Table 6 shows that the SolarShares will affect 2 sites, LPN and LPEW. By site, 67 percent of the sites will have renewable energy. The estimated annual power generation of SolarShares is 8.7 million kWh/year. This renewable energy makes up 39 percent of the estimated annual power currently generated for the headquarters facilities.

Table 6: Renewable Energy

Status	Number of Sites	Estimated Annual Power Generation (kWh)
Renewables In Operation or Construction	0	0
Renewables Proposed	2	8.7 million
Renewable Totals	2	8.7 million
Department Wide Totals	3	8.7 million
Department Wide Renewable Percent	67%	39%

Zero Net Energy (ZNE)

The Governor has set forth the following milestones for state zero net energy buildings:

2020 – 50 percent of new construction & major renovations will be ZNE

2025 – 100 percent of new construction & major renovations will be ZNE

2025 – 50 percent of total existing building area will be ZNE

CalPERS does not currently have any plans for expansion, but is aware of the ZNE new construction and major renovation goals for 2020 and 2025. CalPERS is working towards the 50% ZNE source goal for its existing buildings. This task will be difficult due to the increase in area that CalPERS headquarters has accounted for since the 2003 baseline year.

As covered above, CalPERS has performed many energy conservation projects and will continue to perform energy studies to scope out future reduction projects. In 2016, the source EUI of Lincoln Plaza was 177kBtu/ft2. This source EUI is high as compared to the national average for office spaces because of the 13,000 sq. ft. data center housed within Lincoln Plaza. In June, CalPERS signed a long-term community solar agreement through SMUD, SolarShares that provides the LPN and LPEW facilities with 50 percent of their electricity from local solar. This is estimated to reduce the source EUI to 127 kBTU/ft2.

CalPERS continues to implement energy efficiency measures and look into other renewable energy options to achieve the 50 percent ZNE source goal.

New Construction Exceeds Title 24 by 15%

All new state buildings and major renovations beginning design after July 1, 2012, must exceed the current California Code of Regulations (CCR) Title 24, energy requirements by 15 percent or more.

CalPERS has not designed or performed major renovations on owned buildings since July, 2012. There are no proposed buildings or major renovations in the CalPERS five-year Capital improvement plan. CalPERS is aware of this provision in MM 14-09 and will ensure that any future designed buildings or major renovations exceed the applicable version of Title 24, Part 6, Building Energy Efficiency Standards by 15 percent.

Monitoring Based Commissioning (MBCx)

New and existing state buildings must incorporate Monitoring Based Commissioning (MBCx) to support cost effective and energy efficient building operations, using an Energy Management Control System (EMCS). State agencies managing state-owned buildings must pursue MBCx for all facilities over 5,000 square feet with EUIs exceeding thresholds described in MM 15-04.

According to www.green.ca.gov, MBCx is an ongoing monitoring-enhanced building operation procedure based on the concept of initial building commissioning. An MBCx plan for a building incorporates, at a minimum, the following three components: 1) a permanent building energy information system (EIS) and diagnostic procedure at both the whole-building and sub-system levels: 2) an initial whole building commissioning event emphasizing direct measurements as

opposed to estimations or assumptions and 3) ongoing operations plans and procedures to ensure efficient building operation based on the data collected from the EIS and document energy savings. Each component must include appropriate training for building operations and maintenance personnel, documentation of systems and procedures and a plan for training new personnel to support the ongoing energy management of the building.

LPN, LPEW and LPS all have EMCS systems installed with subsystem metering. EMCS allows the property management team to research equipment setpoints and determine which combination uses the least amount of energy. Additionally, it provides the opportunity for team members to have a deeper knowledge of the building.

The biggest challenge encountered with the EMCS has been updating the software. The software is only updated when the previous version is no longer supported, which is a detailed process.

The Lincoln Plaza buildings are all greater than 50,000 sq. ft. and have a EUI greater than 20 kBtu/ft2, therefore they are required to have MBCx. Table 7 shows that all of the MBCx projects have been completed, and that CalPERS is in compliance.

Table 7: Planned MBCx Projects

Building	Location	Floor Area (ft^2)	EMCS Exists?	MBCx Projected To Start
Lincoln Plaza North	Sacramento	505,098	MBCx Capable	1986
Lincoln Plaza East-West	Sacramento	538,162	MBCx Capable	2006
Lincoln Plaza South	Sacramento	226,522	MBCx Capable	2013

Demand Response

EO B-18-12 directed all state departments to participate in available demand response programs and to obtain financial incentives for reducing peak electrical loads when called upon, to the maximum extent cost-effective.

CalPERS has partnered with the local utility, SMUD, to reduce electricity when it is needed since 2008 through their Voluntary Emergency Curtailment Program. CalPERS currently participates in the Power Direct Automated Demand Response (AutoDR) Program. This program enables the energy use of the facilities to be automatically scaled back during a demand event.

This AutoDR program has been very straight forward to implement. SMUD installed a black box in each building that provides the automated demand response (ADR) signal to the EMCS which has a preset action to turn off the LPN escalators and people movers in the tunnel between LPN and LPEW. The action also increases the set point for the HVAC systems for all buildings. Facilities management is notified each day before there is a demand event. The LPN, LPEW and LPS buildings are all enrolled in the SMUD ADR program. The maximum available reduction for each building is a load of 2,262kW, 2,362 kW and 885 kW respectively.

CalPERS team members are notified annually via e-mail before June that the facilities are participating in the ADR programs and certain equipment, such as the escalators and people movers, may not be available during demand events. Complaints about participation in AutoDR have not been reported.

In Table 8, all three buildings are participating in a demand response program, with the available load reduction of 5,509 kW.

The SMUD AutoDR program has financial benefits as well. In 2016, CalPERS participated in four demand events saving 1,257 kWh or $2,770.

Table 8: Demand Response

Demand Response Participation	Number of Buildings	Estimated Available Load Reduction (kW)
Number of Buildings Participating in 2016	3	5,509
Number of Buildings That Will Participate in 2017	3	5,509
All Department Buildings (Totals)	3	5,509
All Department Buildings (Percent)	100 %	100%

Financing

State agencies are required to pursue all available financing and project delivery mechanisms to achieve these goals including, but not limited to: state revolving loan funds, utility On-Bill Financing (OBF), Power Purchase Agreements (PPAs), GS $Mart, Energy Service Contractors (ESCOs), or other available programs.

CalPERS strives to work with the local utilities to obtain rebates for any projects that are being pursued. Energy efficiency projects are budgeted at least one year in advance of the projects start date. Larger energy efficiency projects may be budgeted over multiple years. As a leader in sustainability, CalPERS will continue to implement energy efficient projects and initiatives as feasible to preserve the state's natural resources.

DEPARTMENT STAKEHOLDERS

Zero Net Energy (ZNE)	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

New Construction Exceeds Title 24 by 15%	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Reduce Grid-Based Energy Purchased by 20% by 2018	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Demand Response	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Renewable Energy	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Monitoring Based Commissioning (MBCx)	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Financing	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Water Efficiency and Conservation Plan

Progress Report and Plan for Meeting
the Governor's Sustainability Goals
for California State Agencies

California Public Employees' Retirement System
Edmund G. Brown Jr., Governor

December 2017

California Public Employees' Retirement System Sustainability Road Map 2018-2019: Water Efficiency and Conservation

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Acronyms

BMP	Best Management Practices
CALGREEN	California Green Building Code (Title 24, Part 11)
DGS	Department of General Services
EO	Executive Order
DWR	Department of Water Resources
ESPM	Energy Star Portfolio Manager
Gal	Gallons
GPF	Gallons per flush
GPM	Gallons per minute
GHGe	Greenhouse Gas Emissions
GSP	Groundwater Sustainability Plan
HVAC	Heating, Ventilation, and Air Conditioning
LCM	The Landscape Coefficient
LEED	Leadership in Energy and Environmental Design
LPEW	Lincoln Plaza East and West
LPN	Lincoln Plaza North
LPS	Lincoln Plaza South
MM	Management Memo
MAWA	Maximum Applied Water Allowance
MWELO	Model Water Efficient Landscape Ordinance
PAOF	Office of Public Affairs
SAM	State Administrative Manual
SGA	Sustainable Groundwater Agency
SGMA	Sustainable Groundwater Management Act
SOP	Sustainable Operations Program
Sq.ft.	Square feet
WMC	Water Management Coordinator
WUCOLS	Water Use Classifications of Landscape Species

Glossary

Backflow - is the undesirable reversal of the flow of water or mixtures of water and other undesirable substances from any source (such as used water, industrial fluids, gasses, or any substance other than the intended potable water) into the distribution pipes of the potable water system.

Back flow prevention device – a device that prevents contaminants from entering the potable water system in the event of back pressure or back siphonage.

Blowdown - is the periodic or continuous removal of water from a boiler or cooling tower to remove accumulated dissolved solids and/or sludge. Proper control of blowdown is critical to boiler operation. Insufficient blowdown may lead to deposits or carryover. Excessive blowdown wastes water, energy, and chemicals.

Compost - is the product resulting from the controlled biological decomposition of organic material from a feedstock into a stable, humus-like product that has many environmental benefits. Composting is a natural process that is managed to optimize the conditions for decomposing microbes to thrive. This generally involves providing air and moisture, and achieving sufficient temperatures to ensure weed seeds, invasive pests, and pathogens are destroyed. A wide range of material (feedstock) may be composted, such as yard trimmings, wood chips, vegetable scraps, paper products, manures and biosolids. Compost may be applied to the top of the soil or incorporated into the soil (tilling).

Critical overdraft - a condition in which significantly more water has been taken out of a groundwater basin than has been put in, either by natural recharge or by recharging basins. Critical overdraft leads to various undesirable conditions such as ground subsidence and saltwater intrusion.

Ecosystem services - are the direct and indirect contributions of ecosystems to human well-being. They support directly or indirectly our survival and quality of life. Ecosystem services can be categorized in four main types:

- Provisioning services are the products obtained from ecosystems such as food, fresh water, wood, fiber, genetic resources and medicines.

- Regulating services are the benefits obtained from the regulation of ecosystem processes such as climate regulation, natural hazard regulation, water purification and waste management, pollination or pest control.

- Habitat services provide living places for all species and maintain the viability of gene-pools.

- Cultural services include non-material benefits such as spiritual enrichment, intellectual development, recreation and aesthetic values.

Grasscycling -refers to an aerobic (requires air) method of handling grass clippings by leaving them on the lawn when mowing. Because grass consists largely of water (80 percent or more), contains little lignin and has high nitrogen content, grass clippings easily break down during an aerobic process. Grasscycling returns the decomposed clippings to the soil within one to two weeks acting primarily as a fertilizer supplement and, to a much smaller degree, mulch. Grasscycling can provide 15 to 20 percent or more of a lawn's yearly nitrogen requirements

Hydrozone – is a portion of a landscaped area having plants with similar water needs that are served by one irrigation valve or set of valves with the same schedule.

Landscape Coefficient Method (LCM) describes a method of estimating irrigation needs of landscape plantings in California. It is intended as a guide for landscape professionals.

Landscape water budget - is the calculated irrigation requirement of a landscape based on landscape area, local climate factors, specific plant requirements and the irrigation system performance.

Model Water Efficient Landscape Ordinance (MWELO) - The Water Conservation in Landscaping Act was signed into law on September 29, 1990. The premise was that landscape design, installation, and maintenance can and should be water efficient. Some of the provisions specified in the statute included plant selection and groupings of plants based on water needs and climatic, geological or topographical conditions, efficient irrigation systems, practices that foster long term water conservation and routine repair and maintenance of irrigation systems. DWR adopted the Model Ordinance in June of 1992. One element of the Model Ordinance was a landscape water budget. In the water budget approach, a Maximum Applied Water Allowance (MAWA) was established based on the landscape area and the climate where the landscape is located. The latest update to MWELO was in 2015. MWELO applies to all state agencies' landscaping.

Mulch – is a layer of material applied on top of soil. Examples of material that can be used as mulch include wood chips, grass clippings, leaves, straw, cardboard, newspaper, rocks, and even shredded tires. Benefits of applying mulch include reducing erosion and weeds and increasing water retention and soil vitality. Whenever possible, look for mulch that has been through a sanitization process to kill weed seeds and pests.

Trickle flow – A device that allows users to reduce flow to a trickle while using soap and shampoo. When the device is switched off, the flow is reinstated with the temperature and pressure resumes to previous settings.

Sprinkler system backflow prevention devices – are devices to prevent contaminants from entering water supplies. These devices connect to the sprinkler system and are an important safety feature. They are required by the California Plumbing Code.

Submeter- a metering device installed to measure water use in a specific area or for a specific purpose. Also known as dedicated meters, landscape submeters are effective for separating landscape water use from interior water use, evaluating the landscape water budget and for leak detection within the irrigation system.

Water Budget - A landscape water budget is the calculated irrigation requirement of a landscape based on landscape area, local climate factors, specific plant requirements and the irrigation system performance.

Water-energy nexus - Water and energy are often managed separately despite the important links between the two. 12 percent of California's energy use is related to water use with nearly 10 percent being used at the end water use. Water is used in the production of nearly every major energy source. Likewise, energy is used in multiple ways and at multiple steps in water delivery and treatment systems as well as wastewater collection and treatment.

Water Shortage Contingency Plans - each urban water purveyor serving more than 3,000 connections or 3,000 acre-feet of water annually must have an Urban Water Shortage Contingency Plan (Water Shortage Plan) which details how a community would react to a reduction in water supply of up to 50 percent for droughts lasting up to three years.

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous Executive Orders directing sustainable state operations. The orders relevant to water are:

Executive Order B-18-12

Executive Order (EO) B-18-12 and the companion *Green Building Action Plan* require state agencies to reduce the environmental impacts of state operations by reducing greenhouse gas emissions, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups; the staff level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

EO B-18-12 requires state agencies to reduce agency-wide water use 10 percent by 2015 and 20 percent by 2020 as measured against a 2010 baseline. The 2015 and 2020 targets reinforce the SB X7-7 requirement that State agencies reduce water use at facilities they operate to support local water suppliers in meeting their targets.

On February 28, 2013, the California Department of Water Resources issued its Water Use Reduction Guidelines and Criteria, pursuant to EO B-18-12. Each applicable agency was required to take actions to reduce water use in facilities and landscapes that are operated by the state, including facilities owned, funded or leased. State operated facilities are defined as facilities where the agency has direct control of the buildings' function, maintenance and repair. For leased facilities, the Green Building Action Plan directed at that time that new and renegotiated

leases include provisions for water conservation, reporting water use and installation of sub-meters to the extent possible and economically feasible.

All of the following sections in this water plan and the accompanying worksheet only repeat the initial criteria and guidelines issued at that time. Only the Model Water Efficient Landscape Ordinance (MWELO) requirements have been updated since that time. Additionally, other EO's have followed, strengthening and elaborating on the issues contained in EO B-18-12.

EO B-18-12 requires that beginning January 2013, agencies shall regularly report current water use into the water tracking database. Since January 2014, annual water use reports have documented progress towards the 2015 and 2020 targets using the ESPM http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_benchmarking to track energy and water use and to submit annual reports to DGS. (Sustainability Manager, Department of General Services, 707 Third Street, 8th Floor, West Sacramento, CA 95798-9052). Additionally, for facilities with landscape areas over 20,000 sq. ft. the landscape water use must be tracked with a water budget program.

Executive Order B-29-15

EO B-29-15 directs state agencies to take actions in response to the ongoing drought and to the State of Emergency due to severe drought conditions proclaimed on January 17, 2014. The Governor directed numerous state agencies to develop new programs and regulations to mitigate the effects of the drought, and required increased enforcement of water waste statewide. Agencies were instructed to reduce potable urban water use by 25 percent between 2013 and February 28, 2016.

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050. To support these goals, this Order requires numerous state agencies to develop plans and programs to reduce emissions.

Other Relevant Executive Orders…

Executive Order B-37-16

EO B-37-16 builds on what were formerly temporary statewide emergency water restrictions in order to establish longer-term water conservation measures, including permanent monthly water use reporting, new permanent water use standards in California communities and bans on clearly wasteful practices such as hosing off sidewalks, driveways and other hardscapes. The EO focuses on using water more wisely, and eliminating water waste by taking actions to minimize water system leaks. DWR estimates that leaks in water district distribution systems siphon away more than 700,000 acre-feet of water a year in California - enough to supply 1.4 million homes for a year.

The EO further strengthens local drought resilience and looks to improve agricultural water use efficiency and drought planning. State agencies are to cooperate with urban water management plans which include plans for droughts lasting for at least five years by assuring that the water efficiency and conservation plan has drought contingency actions.

Drought State of Emergency Declaration

In addition to the EO's listed above, CalPERS adheres to official mandates that support the Orders. In 2016, Governor Brown extended EO B-29-15 and issued The Drought State of Emergency Declaration. The Declaration ordered state agencies to take action and prepare for emergency conditions due to water scarcity by reducing water use by 25 percent compared to the 2013 baseline. Surpassing the mandate, CalPERS reduced water consumption by 44 percent in 2016, saving a cumulative 38 million gallons of water from 2013 through 2016. Although EO B-40-17 ended the drought state of emergency in Sacramento, as a water conservation method, CalPERS continues to have drought measures in place. As new EO's and supporting mandates are released, CalPERS will implement practices to meet the requirements.

State Administrative Manual & Management Memos

The following sections of the State Administrative Manual (SAM), and associated Management Memos (MM), currently impose sustainability requirements for water on the department under the Governor's executive authority:

SAM Sections

- Landscaping practices 1821.5
- Drought moratorium 1821.4

Relevant Management Memos

- MM 15-06 State Buildings And Grounds Maintenance And Operation
- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 14-02 Water Efficiency and Conservation
- MM 14-07: Standard Operating Procedures For Energy Management In State Buildings
- MM 14-09: Energy Efficiency in Data Centers and Server Rooms

Relevant Legislation

Sustainable Groundwater Management Act of 2014 – The Sustainable Groundwater Management Act (SGMA) directs the Department of Water Resources (DWR) to identify groundwater basins and subbasins in conditions of critical overdraft. Conditions of critical overdraft result from undesirable impacts, which can include seawater intrusion, land subsidence, groundwater depletion, and/or chronic lowering of groundwater levels. As defined in the SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts."

As required in the SGMA, basins designated as high or medium priority *and* critically overdrafted shall be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2020. All other high and medium priority basins shall be managed under a groundwater sustainability plan by January 31, 2022.

WATER EFFICIENCY AND CONSERVATION REPORT

This Water Efficiency and Conservation Report demonstrates to the Governor, and the public the progress the Department has made toward meeting the Governor's goals. This report identifies successful accomplishments, ongoing efforts, and outstanding challenges.

Introduction

California experiences the most extreme variability in yearly precipitation in the nation. In 2015, California had record low statewide mountain snowpack of only 5 percent of average while 2012 - 2014 were the four driest consecutive years of statewide precipitation in the historical record. Now, the 2017 water year (October 1, 2016-September 30, 2017) is surpassing the wettest year of record (1982-1983) in the Sacramento River and San Joaquin River watersheds and close to becoming the wettest year in the Tulare Basin (set in 1968-1969). These potential wide swings in precipitation from one year to the next show why California must be prepared for either flood or drought in any year.

Therefore, using water wisely is critical. The EO's and SAM sections listed in the previous section help demonstrate the connection between water and energy use, (the water-energy nexus), water and climate change, and water and landscaping. Further, the impact of water uses by state agencies goes beyond the scope of these EO's and SAM sections and DGS management memos as these documents do not address such related issues as water runoff from landscaping and various work processes and the potential for water pollution or the benefits of water infiltration, soil health and nutrient recycling. However, by using holistic water planning, a well-crafted water plan can not only meet all state requirements but add considerable value and benefits to the organization and surrounding communities. The water efficiency and conservation plan sets priorities, defines tasks, timelines and budgets and designates responsible personnel for each step of the plan.

This plan has two major components. The first component consists of a quantitative inventory of indoor water use by fixtures, boilers and cooling systems and appliances in state buildings and facilities. The second component focuses on outdoor water use and landscaping and includes a measurement of landscape areas and types as well as an assessment of irrigation equipment. Each water plan component includes a mandatory set of best management practices (BMPs) for ongoing water use efficiency in both buildings and landscapes. Additionally, there are further requirements for large landscape water use tracking, if an agency has a total landscape area greater than 20,000 square feet (sq. ft.) at a facility. Both components of water use include monitoring, reporting, oversight and compliance.

Department Mission and Built Infrastructure

CalPERS' mission is "to provide responsible and efficient stewardship of the System to deliver promised retirement and health benefits, while promoting wellness and retirement security for members and beneficiaries."

In harmony with the mission of being a responsible steward of sustainability, CalPERS implemented water efficiency measures that reduce Lincoln Plaza's landscape watering requirements.

Lincoln Plaza has approximately 160,000 sq. ft. of climate appropriate landscaping. Some of this landscape also acts as a "green roof," providing the benefit of reducing the heating, ventilation and air conditioning (HVAC) demand, which further conserves water. For watering, conventional spray was replaced with drip irrigation. Additionally, CalPERS extends its efficiency initiatives and best practices to the daily building operations of Lincoln Plaza.

Lincoln Plaza uses domestic potable and recaptured water, as shown in Table 1. CalPERS purchases 18,137,700 gallons (gal) of domestic potable water which costs $189,670 a year. This water is used for Lincoln Plaza's handwashing, cooling, cleaning and toilet flushing. The domestic potable water is also utilized by the industrial kitchen for CalPERS onsite Café, as well as the tenants, Chocolate Fish and Subway.

Water, including domestic potable and recaptured water is used for daily operations. Lincoln Plaza has a combined area of approximately 1.3 million sq. ft. of office space featuring an underground parking garage, a Trade Room, print room and 13,000 sq. ft. data center. These facilities support over 2,000 team members while offering an onsite coffee kiosk, sandwich shop, café, gym, sundry shop and child care facility.

Table 1 shows that CalPERS used 306,282 gal of recaptured water. The installation of the LPN and LPEW cooling tower recapture tanks allows CalPERS to use recaptured water. The cooling tower water recapture project was completed in the fall of 2015 and continues to perform successfully. This innovative system captures accumulated water from the cooling towers, which would normally go to the combined sewer-storm drain system and uses that water for landscape irrigation purposes. CalPERS provided a project scope to DGS and was awarded a DGS grant to determine additional applications for this recaptured water project. As a result, grant funds were awarded and the project to extend access points for the recaptured water in the LPN garage for pressure washing in the garage was complete.

Table 3: Total Purchased Water 2016

Purchased Water	Quantity(gal)	Cost ($/yr.)
Domestic Potable	18,137,700	$ 189,670
Recaptured Water	306,282	-
Total	18,137,700	$ 189,670

As illustrated in Table 2, LPN is the largest building with the largest number of building occupants followed by LPEW, and then LPS. LPN houses 1,331 CalPERS team members, and uses

6,269,508 gal of indoor water, which equates to 13 gal per capita. LPEW houses 1,137 occupants, and uses 6,446,628 gal of indoor water, which equates to 16 gal per capita. LPS houses 790 occupants, and uses 1,502,310 gal of indoor water, which equates to 5 gal per capita. As discussed in the upcoming sections, the water efficient fixtures and conservation measures contribute to reducing Lincoln Plaza's water use per capita.

Table 4: Properties with Most Water Use Per Capita 2016

Building Name	Area (Sq. ft.)	Building Occupants	Indoor Use gal)	Use per Capita
LPN	505,098	1,331	6,269,508	13
LPEW	538,162	1,137	6,446,628	16
LPS	226,522	790	1,502,310	5
Total	1,269,782	3,258	14,218,446	12

Lincoln Plaza's irrigation use is based on the landscape area sq.ft., see Table 3. LPN has 82,900 sq. ft. and used 3,240,292 gal for irrigation. LPEW has 73,000 sq. ft. and used 561,772 gal for irrigation. LPS has 7,000 sq. ft. and used 117,190 gal. The irrigation use represents the amount of potable water used for irrigation. LPN used more irrigation than LPEW despite having a similar landscaping area because it has a higher density of plants within the landscaped area. In 2016, several leaks were discovered and mended.

Table 3: Properties with Most Landscaped Area 2016

Building Name	Area (Sq. ft.)	Irrigation Use (gal)
LPN	82,900	3,240,292
LPEW	73,000	561,772
LPS	7,000	117,190

To increase water savings, CalPERS adopted several drought water saving measures throughout the facilities. A few of the significant water conservation measures implemented during the drought were the discontinuation of after-hours heating, ventilation, air conditioning (HVAC) requests, reduction of carpet cleaning from daily to as needed, changing irrigation to twice a week and discontinued use of fountains. Additional measures include the reduction of pressure washing from daily to as needed, suspension of annual parking garage scrubbing, elimination of window washing, recapture of water from clean ice from the Café to be used for landscape irrigation and ongoing monitoring of water submeters to identify additional ways to conserve.

Although CalPERS makes continuous effort to conserve water, there are instances when water is necessary for operations. Occasionally team members are required to work overtime on the weekends during the warm months. Typically, the HVAC units are turned off on the weekends

to save energy and water. This could cause the temperature in the buildings to be warmer than regular business hours. Therefore, building management received requests for after-hours HVAC. It was determined that running the HVAC in LPN for one Saturday would use approximately 9,000 gal of water. Consequently, it was decided that after-hours HVAC requests would be discontinued except on a case-by-case basis. This was the single largest water savings effort implemented by CalPERS. While striving to achieve these requirements, CalPERS implemented change management measures to facilitate the transition, therefore educating employees on alternative options and the reason for discontinuation being imperative to achieve compliance.

Another significant water saving measure is Lincoln Plaza's conversion to climate appropriate landscaping. To educate team members on the landscaping significance, informational signage was created and posted near the landscaping. The signage encourages employees to utilize the space for leisure activities, lists the design intentions and how the landscape contributes to environmental preservation. Several landscaped areas offer tables and seating for employees to spend their leisure time.

To promote the conservation initiatives and educate employees on the significance of goals, The CalPERS' Sustainable Operations Program (SOP) hosts onsite events. SOP collaborates with the Office of Public Affairs (PAOF) to create educational signage and publish internal articles, informing team members about the drought significance. The articles also share CalPERS' water conservation measures and practical ways team members can reduce water usage at work and home. One of the articles discussed the cooling tower water recapture project and its chemical free treatment, highlighting the innovative system's water savings benefits. Employees also have access to engaging quizzes to learn about the amount of water consumed to perform household duties and practical ways to reduce consumption. These resources are accessible to employees via the CalPERS internal website. To engage team members about the initiatives an onsite discussion session was conducted with the Chief of Operations Support Services Division to clarify details about CalPERS drought saving measures and respond to inquiries.

SOP also facilitates the CalPERS Sustainability Committee, welcoming all team members to voluntarily meet quarterly to discuss past, current and future conservation initiatives and promotions. One of the Committee's initiatives was the placement of water conservation signage near sinks in the breakrooms and kitchenettes. Also, to demonstrate water efficiency applications, SOP in conjunction with the Sustainability Committee, invited a rainwater collection barrel vendor to demonstrate the benefits of collection barrels to employees. The vendor provided additional resources and answered questions.

The conservation measures were further proven to be successful when CalPERS was awarded the 2016 Sacramento Area Sustainable Business Award from the Business Environmental Resource Center (BERC) and exceeded the Governor's water conservation goals. BERC recognizes top environmentally proactive Sacramento area businesses each year whose work practices demonstrate an outstanding commitment to enhancing sustainability. CalPERS award winning effort includes the cooling tower water recapture project, which is designed to collect approximately 1.7 million gal of water annually for irrigation and maintenance purposes.

In 2015, Lincoln Plaza exceeded the EO B-18-12 requirement to reduce water use by 10 percent compared to the baseline year of 2010, as illustrated in Table 4. In 2010, Lincoln Plaza consumed 26,253,100 gal. In 2015, the total water consumption was 17,840,900 gal or 32 percent less than 2010. CalPERS is required by 2020 to consume less than 21,002,480 gal or reduce consumption by 20 percent. CalPERS exceeded this goal in 2015, five years ahead of schedule.

Table 4: Total Water Reductions Achieved 2015

Year	Total Water Consumption (gal/yr)	Reduction Achieved (%)
Baseline 2010	26,253,100	-
2015 Goal	17,840,900	32%
2020 Goal	21,002,480	20%

In 2016, CalPERS surpassed the water reduction of 25 percent compared to the 2013 baseline year, as required in the Declaration, see Table 5. In 2013, Lincoln Plaza consumed 32,159,000 gal of water. In 2016, CalPERS consumed 18,137,700 gal or a 44 percent reduction.

Table 5: Total Water Reductions Achieved 2016

Year	Total Water Consumption (gal/yr)	Reduction Achieved (%)
Baseline 2013	32,159,000	-
2016 Goal	18,137,700	44%

A significant reduction percentage was realized due to the water conservation strategies. In 2015, CalPERS implemented several measures that contributed to Lincoln Plaza's water reduction, see Table 6 for summary. The LPEW shower heads were replaced with low-flow fixtures and all of LPS' plumbing fixtures were replaced with low-flow models in restrooms.

Table 6: Summary of Indoor Water Efficiency Projects

Year	Project	Estimated Savings(gal)
2015	LPEW shower head replacement	78,000
2015	LPS restroom fixture replacement	1,270,000

Table 7 shows the landscaping hardware efficiency projects that CalPERS conducted from 2015 through 2017. In 2015, the cooling tower water recapture project was implemented and two recapture tanks were installed to collect the accumulated water from the cooling towers for reuse in irrigation. In 2016, existing overhead spray irrigation in living landscaping was replaced with drip. Turf and turf irrigation was removed and existing trees were drip irrigated.

CalPERS added mulch to cover all bare soil to hold in moisture and prevent erosion per the Sustainable Grounds and Landscaping Practices in SAM 1821.5.

In 2017, the recapture system was extended so that the water could be used for cleaning purposes such as spot pressure washing and garage scrubbing. This extension allows the recaptured water to be utilized for cleaning during the rainy months when it is not needed for irrigation. CalPERS extended the cooling tower recapture project by constructing a system that provides access to the recaptured water throughout the LPN garage. This distribution system will allow more of the facility maintenance to be performed without utilizing potable water. CalPERS will continue to research and conduct feasibility studies for additional water conservation initiatives.

Table 7: Summary of Landscaping Hardware Water Efficiency Projects

Year	Project	Estimated Savings(gal)
2015	Cooling tower water recapture system for irrigation	1.7 million
2016	Irrigation conversion	1 million
2017	Recapture system expansion	-

Water Shortage Contingency Plans and Critical Groundwater Basins

Urban water suppliers are required to maintain Water Shortage Contingency Plans that are customized to local conditions. These plans include a staged response to water shortages and droughts lasting up to three years. When implementing the stages of the Water Shortage Contingency Plan, the water supplier will require increasingly stringent reductions in water use.

State agencies are to be aware of their water suppliers' Water Shortage Contingency Plan and the potential impact each stage may have on their water use. State agencies are to have their own contingency plans in place for their building and landscaping water use in order to respond to any stage implemented by the water supplier.

The Sustainable Groundwater Management Act (SGMA) established a new structure for managing California's groundwater resources at a local level by local agencies. SGMA requires, by June 30, 2017, the formation of locally-controlled groundwater sustainability agencies (GSAs) in the state's high and medium priority groundwater basins and subbasins (basins). A GSA is responsible for developing and implementing a groundwater sustainability plan (GSP) to meet the sustainability goal of the basin to ensure that it is operated within its sustainable yield, without causing undesirable results. For those facilities located in critical groundwater basins, state agencies are to work with the local GSA plan.

CalPERS does not have buildings that are located in critical groundwater basins. CalPERS will follow the City of Sacramento's water shortage contingency plan if it is enacted. The City of Sacramento has four stages of supply reduction: stage one- water alert- up to 20 percent reduction, stage two-water warning- up to a 30 percent reduction, stage three- water crisis- up to 40 percent reduction and stage four- water emergency- up to 50 percent reduction. If these

reductions are put in place a plan will be made to meet the reduction target through the curtailment of noncritical water uses such as fountains, cleaning and irrigation.

Building Inventories Summary

An inventory of the Lincoln Plaza facilities indoor water fixtures was performed and all of the existing fixtures are in good condition, see Table 8. The toilet valves in LPN use 1.6 gal per flush (gpf) which was the standard at the time of renovation. LPEW has toilet valves that use 1.28 gpf which meets the current standard. The urinals in all three buildings are ultra-low-flow fixtures that use 0.125 gpf. The faucets aerators vary in flow rate depending on their function. The faucet aerators with the 2.2 and 1.5 gal per minute (gpm) flow rate are located in the kitchens, kitchenettes as well as the coffee stations. The faucet aerators with a flow rate of 0.5 gpm have motion sensing automatic shutoffs and are located in the restrooms. All showerheads have been upgraded to a more efficient models that use a flow of 1.5gpm.

Table 8: Summary of Building Inventory

Building Name	Toilet Valves - 1.6 gpf	Toilet Valves - 1.28 gpf	Urinals - 0.125 gpf	Faucet Aerators - 2.2 gpm	Faucet Aerators 1.5 gpm	Faucet Aerators - 0.5 gpm	Showerheads - 1.5gpm.
LPN	133	0	37	12	0	23	8
LPEW	0	90	30	11	0	90	6
LPS	0	50	10	0	26	50	4

In addition to the items in the Table, CalPERS projects were budgeted 18 months before the physical work started. The LPN dishwasher in the Cafe was recently replaced with an Energy Star model that is estimated to save almost 40,000 gal of water per year. Another recent project as discussed in the previous section is the LPS plumbing fixtures that were replaced with low-flow models.

Heating and Cooling Systems Inventories Summary

Heating and cooling systems play a critical role in occupant comfort. Proper maintenance of this equipment is essential to water efficiency. An inventory of the heating and cooling systems was performed and all equipment is in good condition.

LPN and LPEW use boilers, see Table 9 for summary. These boilers create hot water to provide seasonal heating for the buildings. LPN has a condensing boiler and LPEW has a plate and frame boiler. These boilers are low pressure, low temperature closed loop systems that recirculate water. The water is treated with anti-corrosion chemicals, the chemical levels are monitored and adjusted quarterly. The makeup water utilized for each of these boilers is half of the total boiler volume because the boilers are drained twice a year for maintenance purposes. LPN and LPEW utilize 528 and 800 gal of water for boilers per year respectively.

Table 9: Summary of Boilers Systems Inventory 2016

Building Name	Boiler Type	Water Makeup (gal/yr.)
LPN	Condensing	528
LPEW	Plate and Frame	800

LPN, LPEW and LPS have cooling towers, see Table 10. The LPN and LPEW systems utilize 3,143,6593 and 3,853,440 gal of water respectively. The LPS building is smaller, therefore the cooling tower utilizes less water than the other two systems, only 39,038 gal. All three systems utilize the chemical free dolphin system to control corrosion, prevent scale and disinfect the water as it recirculates in the cooling tower. The water in the LPN and LPEW cooling towers is reused until the conductivity reaches 750 parts per million. At this point, the tower blows down a portion of the water to a 4,000 gal recapture tank that is utilized in conjunction with the irrigation system. In 2016, LPN and LPEW recaptured and reused 306,282 gal of water. LPS utilizes a higher conductivity set point of 500 parts per million. The water quality of the domestic, cooling tower, recaptured and irrigation sources are all tested on a schedule, quarterly or semiannually to ensure that the systems are maintained properly.

Table 10: Summary of Cooling Systems Inventory 2016

Building Name	Cooling System Type	Water Makeup (gal/yr)	Recaptured Water for Irrigation (gal)
LPN	Chemical Free Cooling Towers	3,143,659	215,686
LPEW		3,853,440	90,597
LPS		39,038	0

Irrigation Hardware Inventories Summary

While landscaping serves critical functions, the accompanying irrigation hardware, if not properly installed and maintained, can contribute to water waste. By reviewing and inventorying all irrigation hardware, it is possible to achieve significant water savings.

The irrigation hardware inventory was performed by an outside company, Carson Landscaping. Carson manages the landscaping and irrigation on a regular basis to ensure that all equipment is well maintained and in working order.

All the irrigation systems have sub-meters that measure the amount of water that is used by the irrigation systems. They also have backflow prevention devices installed on the irrigation systems to prevent back-siphoning into the domestic supply.

The LPN and LPEW irrigation systems have an irrigation pump that provides the adequate pressures needed to irrigate up to the fifth or sixth floor of the building. All facilities have pressure regulators to ensure that the irrigation is operating at the manufacture specified pressure to optimize system performance.

Additionally, the Lincoln Plaza irrigation controllers have a weather station that can make weather adjustments. The systems also contain flow sensors that are connected to the irrigation controls that automatically shut off a system leg if high-flow is sensed due to leaks or failures.

Living Landscape Inventory

Far from being just an aesthetic or ornamental feature, landscaping plays a critical role around public buildings and facilities. From providing safety and security, to reducing local heat islands, suppressing dust, reducing water runoff, maintaining soil health, aiding in water filtration and nutrient recycling, landscaping around public buildings is essential. Furthermore, landscaping in public places frequently surrounds historic places and public memorials as well as provides pleasant public gathering spaces.

Additionally, the many vital ecosystem functions carried out by living public landscaping are critical in helping California meet its goals for greenhouse gas reduction, climate adaptation, water and energy efficiency, and water conservation.

A summary of Lincoln Plaza's Living Landscape Inventory is provided in Table 11. The inventory doesn't include onsite historical features or designated memorials, as Lincoln Plaza doesn't have these structures. However, LPN, LPEW and LPS have landscaped areas exceeding 500 sq. ft. with areas of 82,900, 73,000 and 7,000 sq. ft. respectively. The landscaping contains climate appropriate landscape without turf. The landscaping also follows the MWELO which strives to conserve water while maintaining functional healthy landscapes.

Table 11: Summary of Living Landscape Inventory

Building Name	Landscape >500 Sq. ft.	Turf (Sq. ft.)	Climate Appropriate Landscaped Area (Sq.ft.)	MWELO Landscape Area (Sq.ft.)
LPN	82,900	0	82,900	82,900
LPEW	73,000	0	73,000	73,000
LPS	7,000	0	7,000	7,000

During the drought CalPERS made the decision to adapt the existing living landscaping to be more in line with the appropriate climate zone by removing water intensive turf, as mentioned previously, and preserving the existing trees. With the exception of the turf areas, the landscaping was already climate appropriate; however, the majority of the areas were irrigated with overhead spray irrigation. With the announcement of the drought in 2012, a plan was put in to place to convert the spray to drip, remove turf, irrigate existing trees and add mulch to all bare dirt. Lincoln Plaza underwent this transformation over two to three years. The irrigation conversion project cost $133,580. The projects were budgeted in Fiscal Year 2014/2015, the project details were confirmed and completed.

Lincoln Plaza's overhead spray irrigation is in good condition and utilizes the most efficient technology possible. Approximately 20,000 sq. ft. of overhead irrigation remains between the first-floor and garage level of LPN. The removal of the spray and addition of drip on a steep incline would damage the majority of the landscaping. This would come at a great cost as this area consists of many well-established trees and shrubs.

Large Living Landscape Water Use

Large landscape water use often represents a significant percentage of a facility's water use and significant water savings can often be achieved through better irrigation scheduling or inexpensive improvements in irrigation hardware. As part of the Water Use Guidelines and Criteria, the water use for landscape areas over 20,000 sq. ft. shall be tracked through a water budget program.

LPN and LPEW have large landscapes, landscapes greater than 20,000 sq. ft. LPN with 82,900 sq. ft. and LPEW with 73,000 sq. ft. A landscape water budget is the calculated irrigation requirement of a landscape based on landscape area, local climate factors, specific plant requirements and the irrigation system performance. The water budget establishes an efficient standard for the landscape area. The water budget for LPN is 1,820,000 gal and LPEW has a budget of 1,600,000 gal. The actual water use, as captured by the potable irrigation submeter, for LPN was 3,240,292 gal utilizing 178 percent of the budget. As mentioned above, this high irrigation water use is due to leaks that were found and promptly dealt with in the system. LPEW utilized 561,772 gal only 35 percent of the water budget. These buildings also have the cooling tower blow down recapture systems which provide supplemental water used for irrigation. Of the potable water used for irrigation, an additional 8 percent or 306,282 gal was used from the recapture system. Measures are being put in place to increase the amount of recaptured water utilized for irrigation. The landscape maintenance employees have been certified through a WaterSense labeled training.

Table 12. Summary of Large Living Landscape Inventory and Water Budget

Building Name	Landscape >20,000 Sq. ft.	Water Budget (gal)	Irrigation Use (gal)	Percent of Water Budget Used
LPN	82,900	1,820,000	3,240,292	178%
LPEW	73,000	1,600,000	561,772	35%

Best Management Practices

Building Best Management Practices (BMPs) are ongoing actions that establish and maintain building water use efficiency. State agencies are required by DGS Management Memo 14-02 to implement the building BMPs outlined below.

Building Water Management BMPs

CalPERS participates in leak detection and repair BMPs. These practices include monthly water use tracking, the review of water meter data for leaks and performance of monthly visual leak detection survey on all water fixtures.

CalPERS Café kitchen also follows BMP's such as, ensuring that there is no unnecessary water flowing, not using water to defrost food, melt ice and presoak utensils or dishes. Also, all kitchen equipment is inspected quarterly and is operated as efficiently as possible in accordance with manufacturer's recommendations.

Building Heating and Cooling Systems BMPs

The BMPs for boilers and cooling systems save water and energy as well as perform an important safety role. The meters, leak detection processes, and routine maintenance following manufactures instructions required by these BMPs assure that costly repairs are avoided. The scheduled biannual boiler preventive maintenance is the only time a year that the boilers will need to be refilled. The preventive maintenance includes inspection of both the water and fire side of the boilers.

The property management team has a quarterly maintenance program for the cooling systems and boilers. During the review, a building engineer checks that the system is in working order and performs, maintenance measures recommended by the manufacturer and notes unusual findings, if present. If unusual findings are identified, repairs are scheduled immediately. Additionally, Lincoln Plaza uses a hygienist to perform water testing for the cooling towers, boilers, recaptured water, irrigation and domestic water. These services are performed semiannually to maintain healthy conditions, prevent system scale and corrosion and to optimize cycles of concentration. The results indicated that the systems are healthy.

As discussed previously, the cooling towers recirculate the water until a conductivity of 500 to 750 parts per million is reached. The cycles of concentration possible depend mainly on the ambient temperature and the quality of water received from the City of Sacramento. The cooling towers are only utilized when the cooling demand of the HVAC reaches a certain threshold, thereby eliminating water waste.

Landscaping Hardware Maintenance BMPs

The BMPs for living landscaping save water. These measures are performed by the landscape maintenance company. Irrigation hardware such as check valves, wing joints and nozzles are checked by maintenance employees.

Hand watering is only performed as needed while a hydrozone is shut down for maintenance. Hoses are brought in and used with quick couplers to perform irrigation.

Living Landscape BMPs

The BMPs for living landscape save water and prevent future maintenance. The landscaping company contracted to Lincoln Plaza performs monthly testing on irrigation to check for leaks

and other malfunctions. This preventative maintenance prevents damage such as erosion and plant distress from under watering.

All bare soil is covered by a minimum of three inches of mulch. This measure prevents erosion of the soil and evaporation of water from the soil. Watering is performed between 7:00 p.m. and 7:00 a.m. with an appropriate duration for each hydrozone based on the water use classification of landscape species (WUCOLS) depending on the season. By watering for the appropriate duration and at night, runoff and evaporation are prevented, thus saving water. During times of drought, trees and shrubs are prioritized over other plants and are watered, as their replacement will be costly including the water and time already invested in growth.

In the future as plants are replaced, native plant species specific to the climate zone and plants for pollinators will be incorporated into the existing landscaping. These types of plants may use slightly less water than the climate appropriate landscaping already present and would attract local pollinators.

Monitoring, Reporting and Compliance

Each state agency is responsible for monitoring and reporting baseline and annual water use for compliance with the water use reduction targets. Water use shall be measured at facilities that have meters and submeters. Since the passage of EO's B-18-12 and B-29-15, CalPERS has reported water usage monthly through Energy Star Portfolio Manager. CalPERS will continue to comply with the Governor's Orders and conservation efforts to benefit the environment.

DEPARTMENT STAKEHOLDERS

Indoor Water Efficiency Projects In Progress First initiative	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson

Boilers and Cooling Systems Projects In Progress	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson
Landscaping Hardware Water Efficiency Projects In Progress	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson

Living Landscaping Water Efficiency Projects In Progress	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson

Buildings with Urban Water Shortage Contingency Plans In Progress	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson

Green Operations Plan

Progress Report and Plan for Meeting
the Governor's Sustainability Goals
for California State Agencies

California Public Employees' Retirement System
Edmund G. Brown Jr., Governor

December 2017

California Public Employees' Retirement System Sustainability Roadmap 2018-2019: Green Operations

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Acronyms

ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BMCS	Building Management Control System
CALGreen	California Green Building Code (Title 24, Part 11)
CIP	Capital Improvement Plan
CO2e	Carbon Dioxide Emissions
DGS	Department of General Services
EO	Executive Order
EPP	Environmentally Preferable Purchasing
FY	Fiscal Year
GHG	Greenhouse Gas Emissions
GS	Green Seal
HVAC	Heating, Ventilation, and Air Conditioning
IES	Illuminating Engineering Society
IEQ	Indoor Environmental Quality
KWh	Kilowatt Hours
LEED	Leadership in Energy and Environmental Design
MERV	Minimum Efficiency Reporting Value
MTS	Market Transformation to Sustainability
MM	Management Memo
OSHA	Occupational Safety and Health Administration
R2	Responsible Recycling
REC's	Renewable Energy Certificates
SOO	Sequence of Operations
SABRC	State Agency Buy Recycled Campaign
SAM	State Administrative Manual

SCM	State Contracting Manual
SMaRT	Sustainable Materials Rating Technology
SMUD	Sacramento Municipal Utility District
Sq. ft.	Square feet
TC	Technical Committee
TCR	The Climate Registry
TEU	Total Energy Usage
VOC	Volatile Organic Compound
ZEV	Zero Emission Vehicles

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor and legislature have directed state agencies to prioritize sustainable operations. The Orders and legislation relevant to green operations are:

Executive Order B-18-12

Executive Order (EO) B-18-12 and the companion *Green Building Action Plan* require state agencies to reduce the environmental impacts of state operations by reducing greenhouse gas emissions, managing energy and water use, improving indoor air quality, generating onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups, the staff level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

Executive Order B-16-12

EO B-16-12 directs state agencies to integrate Zero Emission Vehicles (ZEVs) into the state vehicle fleet. It also directs state agencies to develop the infrastructure to support increased public and private sector use of ZEVs. Specifically, it directs state agencies replacing fleet vehicles to replace at least 10 percent with ZEVs, and by 2020 to purchase at least 25 percent replacement fleet as ZEVs.

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and

reaffirms California's intent to reduce greenhouse gas emissions to 80 percent below 1990 levels by 2050. To support these goals, this Order requires numerous state agencies to develop plans and programs to reduce emissions.

Assembly Bill 4

Assembly Bill (AB) 4, was passed in 1989. The State Agency Buy Recycled Campaign statutes are in Public Contract Code (PCC) Section 12153-12217. The intent of SABRC is to stimulate markets for materials diverted by California local government and agencies. It requires state agencies to purchase enough recycled content products to meet annual targets, report on purchases of recycled and non-recycled products, and submit plans for meeting the annual goals for purchasing recycled content products.

SGC Resolution on Location Efficiency

Location efficiency refers to the greenhouse gas emissions arising from the transportation choices of employees and visitors to a building as determined by the Smart Location Calculator. Adopted on December 6, 2016 the resolution directs members of the Strategic Growth Council to achieve a 10 percent improvement in the Smart Location Score of new leases compared to the average score of leased facilities in 2016.

State Administrative Manual & Management Memos

The following Management Memos (MM) currently impose requirements for green operations on the department under the Governor's executive authority:

- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 15-06: Building and Grounds Maintenance and Operation
- MM 14-05: Indoor Environmental Quality: New, Renovated, And Existing Buildings
- MM 14-07: Standard Operating Procedures For Energy Management In State Buildings

GREEN OPERATIONS

Greenhouse Gas (GHG) Emissions

State agencies are directed to take actions to reduce enterprise-wide GHG by at least 10 percent by 2015 and 20 percent by 2020, as measured against a 2010 baseline.

CalPERS surpassed the 2015 GHG goal of 10 percent reduction by implementing conservation practices that reduce energy, as well as, through the purchase of renewable energy certificates (RECs), thereby reducing CalPERS' carbon footprint. In addition, CalPERS goes above and beyond by having a third-party verifier, approved by The Climate Registry (TCR), verify the annual GHG inventory. The GHG inventory includes GHG sources from all aspects of operations, such as gasoline for fleet vehicles, diesel for backup generators, propane for forklifts, refrigerant, natural gas and electricity for all supported, leased and owned facilities.

CalPERS Lincoln Plaza Headquarters buildings are high-performing, with energy performance within the 86th percentile of buildings in the national population. In 2017, Lincoln Plaza achieved the following Energy Star scores out of 100: LPEW, 94, LPS, 94, and LPN, 87. CalPERS continues to implement energy conservation initiatives in the areas of heating, ventilation and air conditioning (HVAC), lighting, purchasing Energy Star office equipment, energy efficient upgrades and implementing initiatives focused on reducing energy consumption. LPN efficiency projects include first-floor tenant improvements and rooftop damper upgrades. Voluntary energy efficiency measures, such as hot aisle containment, have been implemented in the 13,000 square foot (sq ft.) LPW data center. Even with these measures in place, CalPERS Headquarters creates the majority of the natural gas carbon in the CalPERS GHG inventory, 98 percent.

To offset electricity emissions, CalPERS purchases Renewable Energy Certificates (REC's) through the Sacramento Municipal Utility District (SMUD) Greenergy Program for its Lincoln Plaza Headquarters. The SMUD Greenergy Program allows CalPERS to report that its facilities have zero emissions from electrical energy provided by SMUD. Since 2016, CalPERS has received a mix of Green-e certified wind and solar generation from the State of California to offset 100 percent of the electric energy consumed by CalPERS' Lincoln Plaza Headquarters. At year end, this allows CalPERS to claim that the Headquarters facilities had zero emissions from electrical energy provided by SMUD. In addition, CalPERS' participation in this program increases the demand for clean energy and supports SMUD's decision to have more renewable zero emission generation sources.

In August 2017, CalPERS entered into an agreement for 8.7 million kilowatt hours (kWh) per year of community solar through the SMUD SolarShares program. In addition to CalPERS continuing to participate in the Greenergy Program, SolarShares, will provide LPN and LPEW with approximately 50 percent of their energy from a local solar farm. This agreement means

that 82 percent of the Headquarters total area will be participating in a renewable energy program. Additional benefits of this program include a set amount of delivered energy, not subject to panel degradation or weather variation, and no need for maintenance or repairs, as required by onsite solar. Beginning in the 2017 emission year, CalPERS will realize the benefits of the program.

CalPERS' efficiency initiatives extend to the fleet. Since 2010, travel has increased due to business needs. Consequently, GHG has increased by 31 percent since the baseline was established in 2010. Currently, 76 percent of CalPERS' vehicles are eight years or older. Due to the short distances the CalPERS fleet vehicles travel, and the Department of General Services' (DGS) existing replacement thresholds of 120,000 miles for sedans, station wagons, vans and light duty trucks, and 150,000 miles for four-wheel drive and heavy-duty vehicles, these vehicles have not been eligible for replacement. However, with the new proposed thresholds lowering mileage requirements and adding age thresholds, CalPERS will be able to begin procuring more fuel-efficient vehicles.

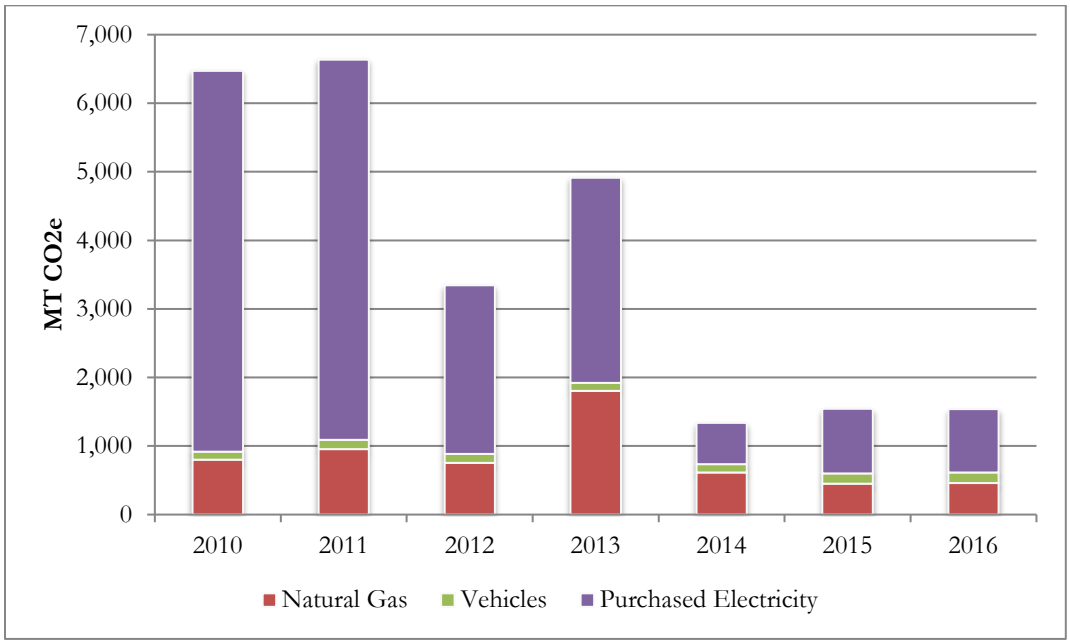
As mentioned previously, EO B-18-12 requires state agencies to reduce GHG by 20 percent by 2020 based on a 2010 baseline. From 2010 to 2016, CalPERS has consistently reduced its total GHG compared to the baseline as shown in Table 1 and Graph 1. In 2010, CalPERS generated a total of 6,470 tons of carbon dioxide emissions (CO2e).

In 2015, CalPERS generated a total of 1,615 tons CO2e, a reduction of 4,855 tons CO2e or a 75 percent, reduction as compared to the 2010 baseline. In 2016, The Climate Registry recognized CalPERS for having the highest percent reduction in entity-wide GHG as compared to other state agencies. The Lincoln Plaza Headquarters total emissions were 1,539 tons of CO2e or a reduction of 76 percent in 2016, as compared to the 2010 baseline.

Table 5: GHG Emissions since 2010 (tons)

	2010	2011	2012	2013	2014	2015	2016	Percent Change since Baseline
Natural gas	799	954	752	1,805	613	451	462	42%
Vehicles	117	134	134	116	122	150	153	-31%
Purchased Electricity	5,554	5,549	2,459	2,993	604	1,014	924	83%
Total	6,470	6,637	3,345	4,914	1,339	1,615	1,539	76%

Graph 1: GHG Emissions since 2010



Building Design and Construction

EO B-18-12 requires that all new buildings, major renovation projects and build-to-suit leases over 10,000 square feet shall obtain LEED® Silver certification or higher. All new buildings under 10,000 square feet shall meet applicable CalGreen Tier 1 Measures. New buildings and major renovations greater than 5,000 square feet (sq. ft.) are also required to be commissioned after construction.

State agencies shall implement mandatory measures and relevant and feasible voluntary measures of the California Green Building Standards Code (CALGreen), Part 11, related to indoor environmental quality that are in effect at the time of new construction or alteration and shall use adhesives, sealants, caulks, paints, coatings, and aerosol paints and coatings that meet the volatile organic chemical (VOC) content limits specified in CALGreen.

CalPERS does not have any new building construction or major renovations planned for the future. If buildings are added, the plans will comply with CalGreen Tier 1 code, LEED and green building best practices.

LEED for Existing Buildings Operations and Maintenance (EBOM)

All state buildings over 50,000 sq. ft. were required to complete LEED®EBOM certification by December 31, 2015 and meet or exceed an Energy Star rating of 75, to the maximum extent, cost effective. As seen in Table 3, all three of the Lincoln Plaza buildings have achieved LEED® EBOM before the deadline. In 2014, LPN was recertified as LEED®O+M Gold and LPEW was recertified LEED® O+M Platinum, the highest level of certification. In October 2015, LPS was certified LEED® O+M Gold.

These buildings achieved high LEED® certifications because of CalPERS' commitment to green operations. Many of the credits that were achieved required commitment to these goals on an operational level, such as, green cleaning policies, sustainable purchasing policies and optimization of the facilities energy performance. Some of the LEED® credits achieved are due to the built-in features of the building. These features include the landscaped terracing throughout LPN that reduce the heat island effect, exterior lighting that is dark sky compliant and chemical free cooling tower water treatment.

Table 3: LEED for Existing Buildings and Operations

Number of Buildings over 50,000 sq. ft. and eligible for LEED EBOM	Number of Building over 50,000 sq. ft. that have achieved LEED EBOM	Percentage of buildings over 50,000 sq. ft. required to achieve LEED EBOM that have achieved it
3	3	100%

Lincoln Plaza will recertify under LEED® version 3 for the final time in December 2017. LEED® version 4 will be replacing the current rating system. This will give CalPERS five years to plan for new efficiency measures and determine how the LEED® credits will transfer between the rating systems so that the scores can be maintained.

Indoor Environmental Quality

When accomplishing alterations, modifications, maintenance repairs, also when relevant and feasible, state agencies shall implement the mandatory and voluntary measures of the CALGreen, Part 11, related to indoor environmental quality.

Indoor environmental quality (IEQ) must also be maintained through the use of low emitting furnishings, cleaning products and cleaning procedures. CalPERS' internal website discusses indoor environmental quality initiatives.

New Construction and Renovation

CalPERS does not have any major renovations or new construction planned. Small renovation projects are performed by the property management team through outside contracts. During renovations, there are steps taken to ensure the continued health of occupants and compliance of green building best practices.

Voluntary measures from CalGreen and LEED® are followed for all building projects. These include ensuring that all adhesives, sealants, caulks, paints, coatings, and aerosol paints and coatings meet the volatile organic chemical (VOC) content limits specified in CALGreen. Additionally, the carpet systems, carpet cushions, composite wood products, resilient (e.g., vinyl) flooring systems, and thermal insulation, acoustical ceilings and wall panels meet the VOC emission limits specified in CALGreen. The majority of these products are purchased by outside contractors and the product specifications are included in their contract language.

During renovation projects, all mandatory and relevant voluntary measures are followed from CALGreen Division 5.5 and Appendix A5.5, including the IEQ Construction management plan.

Furnishings

CalPERS purchases its furniture from Knoll Manufacturing Company. The brand of workstation panels and surfaces is Morrison. Morrison furnishings are LEED® and GREENGUARD® Indoor Air Quality certified. The panels are 100 percent recycled content fabric and the frames, particle board, and wood components are from recycled material. The powdered coating is 99 percent Volatile Organic Compound (VOC) free.

The Knoll Life Chair is Sustainable Materials Rating Technology (SMaRT), Certified. The SMaRT rating is to products what LEED® is to buildings and was established based on the LEED® model. It is a set of consensus-based sustainable product standards considering the environment, economy and social equity. Categories that SMaRT covers include building products, fabric, flooring and carpet. The standards incorporate the life cycle assessment and all 24 leading sustainable product standards within its rating criteria.

SMaRT products must score a minimum of 28 out of 162 points in the following areas: Safe for Public Health and Environment, Energy Reduction and Renewable Energy, Biobased or Recycled Materials, Company and Facility Requirements, Reclamation, Sustainability Reuse, End of Life Management and Innovation in Manufacturing. The Life Chair has a rating of 71 and is Certified Gold. SMaRT has been adopted by several organizations including the American Institute of Architects, United States Green Building Council and its LEED® Rating System, Sustainable Furniture Council and Wall Street Capital Markets Partnership and Fireman's Fund.

Cleaning Products

CalPERS has a janitorial contract with Metro Maintenance (Metro). The contract is written so that all of the cleaning products utilized onsite meet Green Seal (GS)-37 or an equivalent standard and are low emitting.

Cleaning Procedures

Metro, meets the requirements in the Green Seal Standard GS-42. The property management team is looking into applying for certification and adding the GS-42 certification to the janitorial contract. The cleaning procedures for Title 8 Section 3362 are also followed for the prevention of water intrusion.

Entryway systems are maintained as specified in CalGreen A5.504.5.1. LPN and LPS meet the more stringent LEED® standard for entryway systems. All vacuum cleaners used within Lincoln

Plaza achieve the Carpet and Rug Institute Seal of Approval. Cleaning procedures follow the Carpet and Rug Institute's *Carpet Maintenance Guidelines for Commercial Applications*.

HVAC Operation

Lincoln Plaza's HVAC systems are compliant with American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 62.1-2010. Through the online workflow facilities management system, IMPAK, the property management team responds to daily maintenance requests, and schedules preventative maintenance actions. This includes the scheduling of all preventative maintenance measures for the HVAC systems throughout the year. As a LEED® requirement, verification of minimum outdoor airflows using hand-held airflow measuring instruments is performed periodically.

Compliant with Section 120.1(c) 2 of Title 24, Lincoln Plaza buildings are ventilated with a minimum rate of one hour before occupancy. The HVAC uses Minimum Efficiency Reporting Value (MERV) 8 for pre-filters and MERV 13 for the final filters. Air filters are cleaned and replaced based on the manufacturer's specified interval. Semiannual air testing is performed to ensure indoor air quality, which includes checking the first 20 feet of ductwork downstream of cooling coils. Also, quarterly verification is conducted to ensure all outdoor dampers, actuators and linkages operate properly.

Lincoln Plaza's cooling towers were designed to prevent plumes closer than 25 feet to any building air intake. The water quality of the domestic, cooling tower, recaptured and irrigation sources are all tested on a schedule, quarterly or semiannually, to ensure that the systems are maintained properly.

Integrated Pest Management

Department employees and contracted pest management companies will follow an Integrated Pest Management (IPM) strategy that focuses on long-term prevention of pests through monitoring for pest presence, improving sanitation, and using physical barriers and other non-chemical practices. If non-chemical practices are ineffective, Tier III pesticides may be used, progressing to Tier II and then Tier I, if necessary. The Tier system denotes the level of hazard: greatest hazard (Tier I) to least hazard (Tier III).

IPM is already integrated into the pest management contracts. Lincoln Plaza is serviced by two different companies that treat for pests, Orkin and Carson Landscape Industries, as seen in Table 4. Both contracts have provisions that align the contractor practices with LEED® and MM 15-06. Pesticide information is available to employees via the CalPERS internal website.

Table 4: Pest control contracts

Pest Control Contractor	IPM Specified (Y/N)
Orkin	Y
Carson Landscape Industries	Y

Environmentally Preferable Purchasing

State agencies are required to purchase and use environmentally preferable products (EPP) that have a reduced effect on human health and the environment when compared with competing goods that serve the same purpose.

Reducing Impacts

CalPERS is committed to reducing the environmental impact of the goods and services that are purchased, since procuring EPP containing post-consumer recycled content and minimizing waste can have a positive impact on the environment.

The State Agency Buy Recycled Campaign (SABRC) is a joint effort between CalRecycle and DGS to implement state law requiring state agencies and the legislature to purchase recycled content products (RCP) and track purchases in accordance with Assembly Bill (AB) 75, Public Contract Code (PCC) 12153-12320. SABRC requires that state agencies purchase a specific percentage of recycled products. This program stipulates minimum purchase percentages for items in 11 reportable categories. CalPERS reports on the four categories of reportable products that it currently purchases. While CalPERS may use some other reportable categories of product, such as paint, antifreeze and lubricating oil, the products are all purchased through outside contract services and are selected by the vendor.

Per the mandate, 50 percent of the purchases made from these product categories must contain minimum amounts of post-consumer recycled content. In Fiscal Year (FY) 2016/2017, CalPERS met the minimum requirement in all four reportable categories: Plastic Products, 88 percent, Printing and Writing Paper, 88 percent, Paper Products, 90 percent, and Metal, 100 percent. For CalPERS to meet this goal, PeopleSoft eProcurement, the system used to purchase goods, provides requestors with alternatives to standard office supplies that offer comparable utility and similar price, in addition to providing a lessened impact on the environment. Requestors procure recycled-content materials, paper, and packaging products made from a minimum of 30 percent post-consumer recycled content. In addition, guidelines for purchasing green products were developed to support CalPERS' efforts in meeting legislative mandates for the purchase of recycled-content and EPP. These guidelines are available to the requestors via the Intranet along with a list of most commonly purchased products with post-consumer recycled content.

The primary website used to request to purchase goods is ItemGrabber. CalPERS communicated with ItemGrabber about increasing the visibility and accessibility of recycled content products. As a result, ItemGrabber has made modifications and accommodations to their website to help streamline the procurement process. One of the modifications is the development of a tab titled, "Recycled" to provide resources to purchase recycled content, increase compliance and facilitate the process of purchasing EPP in CalPERS' reportable categories.

Starting January 1, 2020, the requirements for minimum compliant purchases within each reportable category under the SABRC will be raised to 75 percent. Although CalPERS surpassed these markers in FY 2016/2017 this mandate will guarantee that post-consumer recycled content purchases for future fiscal years also meet or exceed these new standards. To ensure

that these goals are consistently met, CalPERS will emphasize these changes and the increased need for post-consumer content purchasing in all procurement and sustainable purchasing training.

Paint

Contractors use paint onsite that is compliant with the volatile organic chemical (VOC) content limits specified in CALGreen.

Recycled Paint

Painting at CalPERS is performed via outside contract services. The service providers are responsible for purchasing and storing paint. The paint is purchased on a job-by-job basis. CalPERS does not purchase paint, the contractors provide it when hired for a job.

Environmentally Preferable Purchasing – Lubricating Oils, Antifreeze, Tire Retread

Maintenance performed on the CalPERS fleet vehicles is performed via outside contract services. The service providers are responsible for purchasing the oil, antifreeze and tires used on CalPERS vehicles. CalPERS does not purchase lubricating oils, antifreeze or tires for its vehicle fleet.

IT Goods & Office Equipment

Computers, monitors, copiers, printers and scanners are set to utilize the built-in energy saving mode during periods of inactivity. Over 90 percent of devices switch to energy saver mode after 30 minutes of inactivity.

Janitorial Supplies

CalPERS has adopted a green cleaning program. This includes using cleaning and paper products that are Green Seal Certified. The cleaning products and paper products meet the requirements for LEED® Green Cleaning Products and Materials credit and the DGS Purchasing Standards. The paper products also meet the SABRC requirement of a minimum of 30 percent post-consumer content.

Desk Lamps

CalPERS purchases workstation furnishings from Knoll, as specified. Knoll's environmental policy goal categories are: sustainable use of natural resources, waste reduction and protection of the biosphere. All of Knoll's operations, policies and progress are reviewed once a year as part of their Environmental Management System.

The task lighting, under the overhead cabinets in the workstations, have an Energy Star Equivalency of four lighting, LEED two- recyclable and biodegradable material. CalPERS is currently not procuring any new workstation furnishings with the exception of ergonomic furniture for health and safety needs. All new purchases of desk light fixture will follow EPP purchasing standards as specified in the Purchasing Standard DGS-39115A.

Paper Products

As mentioned previously, CalPERS complies with PCC 12153-12320 and SABRC, requiring that state agencies purchase a specific percentage of recycled products. Per the mandate, 50 percent of the purchases made from these product categories must contain minimum amounts of post-consumer recycled content. In FY 2016/2017, CalPERS exceeded the minimum requirement in all four reportable categories by 38 percent.

Remanufactured Toner

CalPERS purchases remanufactured toner from T3 Office Recycling Solutions (T3). T3 follows the accredited certification standard, the Responsible Recycling (R2) Standard for Electronics Recyclers Exit which lists requirements regarding environmental, health, safety and security aspects of electronics recycling. R2 focuses on: environmental and public health, worker health and safety, data and facility security and the recycling process and chain of custody materials.

Measure and Report Progress

To measure, monitor, report and oversee the EPP progress, CalPERS analyzes monthly purchase reports. The report process has two components: monthly preparation and annual reporting. The monthly preparation entails creating a monthly spreadsheet and evaluating each of the four CalPERS reportable categories to determine if each category meets the 50 percent post-consumer recycled requirement. Once the report is completed, it is reviewed by the sustainability program management team. The annual SABRC Report must be submitted to CalRecycle by October 31 each year. It covers the purchases made during the current fiscal year. Ongoing oversight and education is in place to ensure compliance.

Table 5 reflects CalPERS' 2016 SABRC compliance percentages for the four reportable categories: Plastic Products, 88 percent, Printing and Writing Paper, 88 percent, Paper Products, 90 percent, and Metal, 100 percent.

Printing and Writing Paper had the largest amount of SABRC Reportable Dollars. Of the $467,313.70 SABRC Reportable Dollars $413,372.65 or 88 percent, was SABRC Compliant Dollars. For Paper products, of the $154,953.59 SABRC Reportable Dollars, $139.393.00 or 90 percent was SABRC Compliant Dollars. Plastic products of the SABRC Reportable Dollars, $396,842.10, $350,817.45, or 88 percent were SABRC compliant dollars. Metal had the smallest amount of SABRC Reportable Dollars, $244,288.13 or 100 percent was SABRC Compliant Dollars.

Table 5: State Agency Buy Recycled Campaign 2016 Performance

Product Category	SABRC Reportable Dollars	SABRC Compliant Dollars	% SABRC Compliant
Antifreeze	N/A	N/A	N/A
Compost and Mulch	N/A	N/A	N/A
Glass Products	N/A	N/A	N/A
Lubricating Oils	N/A	N/A	N/A
Paint	N/A	N/A	N/A
Paper Products	154,953.59	139,393.00	90%
Plastic Products	396,842.10	350,817.45	88%
Printing and Writing Paper	467,313.70	413,372.65	88%
Metal Products	244,228.13	244,228.13	100%
Tire Derived Products	N/A	N/A	N/A
Tires	N/A	N/A	N/A

CalPERS is constantly looking for additional ways to meet and exceed the SABRC requirements. The top four commodities listed are: Paper Products, Printing and Writing Paper, Plastic and Metal, as illustrated in Table 6. All of CalPERS' categories exceed the minimum percentage by at least 38 percent. As shown in Table 6, CalPERS' commitment to increase EPP per commodity are 2 percent, 2 percent, 2 percent and 0 percent, respectively.

Table 6: Commodities categories with the greatest Potential to Green

Commodity	2016 Total Spend ($)	2016 Percent EPP Spend (%)	Commitment to Increase EPP per Commodity (%)
Printing and Writing Paper	467,313.70	88%	2%
Paper Products	154,953.59	90%	2%
Plastic	396,842.10	88%	2%
Metal	244,228.13	100%	0%

Sustainability Development and Education

CalPERS consistently educates its employees on the importance of EPP commodity purchases. Throughout the year, buyers are sent e-mail reminders, requesting to purchase EPP. Also, there is a SABRC Coordinator, who is dedicated to EPP and reviews purchases monthly. The Coordinator also provides additional resources, responds to inquiries and identifies additional ways to increase the purchase of recycled content products.

CalPERS conducts an internal training that was completed by all buyers. The training provides continued education and awareness of recycled content products. Additionally, requestors and buyers have access to CalPERS' internal website that provides resources for companies that offer recycled content products.

Location Efficiency

Location efficiency refers to the effect of a facility's location on travel behavior and the environmental, health and community impacts of that travel behavior including emissions from vehicles. Locating department facilities in location efficient areas reduces air emissions from state employees and users of the facilities, this contributes to the revitalization of California's downtowns and town centers, helps the department compete for a future workforce that prefers walkable, bikeable and transit-accessible worksites and aligns department operations with California's planning priorities.

DGS' goal is that the average location efficiency score for all new leases be 10 percent higher than our average on of Jan 1, 2017.

CalPERS does not have any new leases. Lincoln Plaza, scored 80-89, which falls into the category of "Very Good" based on the Smart Location Calculator. Located in downtown Sacramento, Lincoln Plaza is within walking distance to restaurants, pedestrian trails, shops, bicycle networks and public transportation. To encourage visiting local attractions, CalPERS' Bike Share Program allows employees to borrow bicycles for leisure or business needs free of charge.

CalPERS will continue to monitor Lincoln Plaza's building systems to identify additional ways to conserve while meeting the Governor's sustainability requirements.

DEPARTMENT STAKEHOLDERS

Greenhouse Gas Emissions	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Building Design and Construction	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

LEED for Existing Buildings Operations and Maintenance	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Indoor Environmental Quality	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Integrated Pest Management	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Environmentally Preferable Purchasing	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

Location Efficiency	
Individual or division name	Title, role, responsibilities, managers, etc.
OSSD	Shanton Tyson, Sustainability Coordinator

SUSTAINABILITY MILESTONES & TIMELINE