DGS Sustainability Roadmap 2018-19

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

Department of General Services

Edmund G. Brown Jr., Governor

DGS GENERAL SERVICES

Department of General Services Sustainability Road Map 2018-19:

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Acronyms

AB	Assembly Bill
ADR	Automated Demand Response
AMB	Asset Management Branch (at DGS)
BMP	Best management practices
CA	California
CALGREEN	California Green Building Code (Title 24, Part 11)
CEC	California Energy Commission
DGS	Department of General Services
DWR	Department of Water Resources
EHT	Extreme heat threshold
EMS	Energy management system (aka EMCS)
EMCS	Energy management control system (aka EMS)
EO	Executive Order
EPP	Environmentally preferable purchasing
ESCO	Energy service company
ESPM	Energy Star Portfolio Manager
ETS	Enterprise Technology Solutions (a division at DGS)
EUI	Energy use intensity (source kBTU/sq. ft.)
EVSE	Electric vehicle supply equipment (charging equipment)
FMD	Facilities Management Division (a division at DGS)
GCM	Global circulation model
GHG	Greenhouse gas
GHGe	Greenhouse gas emissions
GSP	Groundwater Sustainability Plan
IEQ	Indoor environmental quality
kBTU	Thousand British thermal units (unit of energy)
LCM	The Landscape Coefficient Method
LEED	Leadership in Energy and Environmental Design
MAWA	Maximum applied water allowance
MM	Management Memo
MWELO	Model Water Efficient Landscape Ordinance
OBAS	Office of Business and Acquisition Services (at DGS)
OBF	On-bill financing

OFAM	Office of Fleet and Asset Management (at DGS)
OS	Office of Sustainability (at DGS)
PMDB	Project Management and Development Branch (at DGS)
PPA	Power purchase agreement
PUE	Power usage effectiveness
RCP	Representative Concentration Pathway
SABRC	State Agency Buy Recycled Campaign
SAM	State Administrative Manual
SB	Senate Bill
SCM	State Contracting Manual
SGA	Sustainable groundwater agency
SGMA	Sustainable Groundwater Management Act
WMC	Water management coordinator
WUCOLS	Water Use Classifications of Landscape Species
ZEV	Zero-emission vehicle
ZNE	Zero net energy

EXECUTIVE SUMMARY

DGS serves as the state of California's business manager, providing state agencies with services including procurement and acquisition, real estate management and design, transportation, professional printing, administrative hearings, and funding and oversight for school construction. Created in 1963, DGS has 4,000 employees within six divisions and multiple offices. DGS manages a portfolio of 69 state-owned buildings totaling 18.5 million square feet across the state. DGS led the development of Governor Brown's Executive Order B-18-12, and its Green Building Action Plan. DGS coordinates implementation of state sustainability initiatives through its Office of Sustainability, working closely with all DGS divisions, state agencies and the governor's office.

DGS leads the state's efforts to reduce greenhouse gas emissions, energy and water use in state government operations, from state facilities and state vehicles to the products state agencies buy to serve California. While growing 11 percent in building area over the past 15 years, DGS has reduced its environmental impacts with outstanding results, including the following:

- Reduced greenhouse gas emissions (GHGe) of DGS facility and transportation operations 57 percent in 2017 from 2010 baseline
- Increased zero-emission fleet vehicles 40 percent since 2014 and working to provide adequate supporting infrastructure
- Reduced energy use 17 percent in 2017 compared to 2003 levels
- Improved energy efficiency 25 percent compared to 2003 levels
- Achieved zero net energy for 21 percent of DGS building area as of June 2018
- Reduced water use 18 percent in 2017 compared to 2010 levels

Climate Change Adaptation

Through site and building orientation, thermal mass, shading, etc., designers and project managers develop design criteria to mitigate the effects of climate change on state infrastructure. DGS design-build teams consider the life cycle cost analysis of building systems, use ZNE screening to identify energy use intensity, and include criteria in new building projects that improve adaptability to current and future climate change.

Many DGS facilities are located in disadvantaged communities, where vulnerable populations are impacted by climate change. Urban heat islands are impacted by localized temperature spikes, which can be mitigated through tree planting programs, cool roofs and pavements, and other measures. Understanding these risks and incorporating new design features in future planning will allow adaptation to climate change effects in California. DGS has taken the first big step in this process by identifying the facilities most vulnerable to climate change impacts using Cal-Adapt data. The next step going forward will be to work with DGS teams responsible for new construction and repairs or retrofits to incorporate measures to improve climate resilience.

Zero-Emission Vehicles

The 2016 ZEV Action Plan establishes goals to provide electric vehicle charging to state-owned parking spaces and zero-emission vehicles (ZEVs). The DGS Office of Fleet and Asset Management (OFAM) oversees the state's vehicle and mobile equipment fleet, and ensures compliance with state and federal policies. OFAM provides alternative fuel vehicle solutions to green the state fleet.

A widespread shift to ZEVs is essential to reducing GHGe. DGS is making progress in meeting the 2020 goal with 10 percent of the fleet already comprised of ZEVs. In addition, between 2012 and 2016, DGS reduced fleet CO2 emissions from almost 17 million lbs. to less than 7 million lbs. As DGS replaces aging gasoline-powered vehicles with new ZEVs, emissions are further reduced. Ninety fleet vehicles are currently eligible for replacement with ZEVs, and fleet ZEVs will increase from 40 to 105 by fiscal year 2021-22. DGS' Office of Sustainability (OS) is expanding ZEV charging infrastructure (electric vehicle supply equipment, or EVSE) at DGS facilities and assisting other state departments with their facilities. To meet significant infrastructure needs going forward, DGS will continue to gather ZEV and EVSE data from all departments and leverage approved budget change proposal (BCP) funding to provide both technical support in site assessments and installations as well as policy support in pricing and planning to meet these aggressive goals.

Energy

DGS continues to improve energy efficiency in the buildings it manages and has improved the overall energy efficiency (reduced energy use intensity) of its portfolio by 25 percent since 2003. Even though the DGS building portfolio grew 11 percent during this time period, DGS was still able to reduce its total energy use by more than 15 percent.

DGS has developed alternative financing mechanisms that all state agencies can use to finance energy efficiency upgrades and on-site renewable energy installations. OS manages programs that leverage this financing to upgrade energy efficiency at state facilities. Through power purchase agreements (PPAs), solar energy generation comprising more than 42 megawatts has already been installed at state facilities, with another 50 megawatts planned over the next three years. These projects included renewables at four DGS facilities.

DGS entered into two 20-year community solar agreements with SMUD to generate 39 more megawatts of renewable energy. Renewable energy powers 39 percent of the entire DGS portfolio of state buildings. DGS developed and issued a new zero net energy (ZNE) policy in 2017, and 21 percent of its building portfolio is ZNE as of June 2018. Going forward, DGS will continue to seek cost-efficient on-site opportunities where solar and real estate resources are favorable. Additional community solar options are also being pursued. DGS is pursuing energy efficiency retrofits at a majority of DGS buildings, which will continue to reduce total energy use.

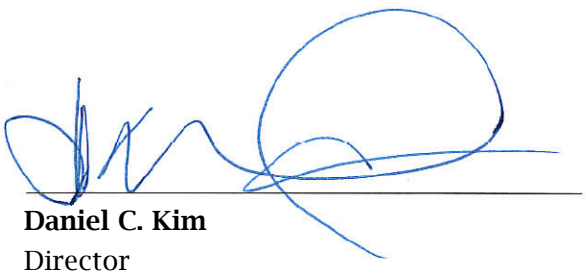
Water Efficiency and Conservation

DGS reduced total water use by 18.4 percent in 2017 compared with a 2010 baseline, nearly meeting Executive Order B-18-12's 2020 goal to achieve a 20 percent reduction for state agencies. DGS is working to close this 1.6 percent gap through more water conservation projects underway, and is constantly working to reduce water use. Much of this water savings resulted from the Water Conservation and Drought Response funding program, which replaced hundreds of high-use water fixtures and over 1,500 faucet aerators in DGS-controlled buildings throughout the state. Upgraded irrigation controllers and metering systems for water-efficient landscaping also helped reduce water usage. DGS has several more water conservation projects underway that will result in more savings. DGS also managed a $10 million water conservation grant program that funded 165 projects in 30 state agencies, cutting 300 million gallons of annual water use. Because drought planning needs to be a constant effort, DGS will make water conservation an ongoing initiative.

Green Operations

DGS has more than 10 million square feet of LEED certified buildings and managed the design, construction, and/or leasing of most of the state's 235 LEED certified buildings. DGS reduces GHGe through fuel-efficient and zero-emission vehicle use, energy reduction efforts, renewable energy, and wise water and green building operations. DGS reduced its GHGe by 57 percent in 2017 (compared with 2010 levels), far exceeding the state's 20 percent by 2020 target. The Facility Management Division (FMD) uses green cleaning products and methods and follows integrated pest management practices to improve indoor air quality whenever available. The Procurement Division (PD) leads the state's environmentally preferable purchasing (EPP) efforts and has developed state contracts for products and services with reduced environmental impacts. PD also developed the new state FI$Cal purchasing program, which for the first time will be able measure statewide purchases of EPP products. Because green operations encompass activities from multiple divisions, DGS will ensure that all activities are integrated and coordinated in order to achieve the greatest impact.

DGS partners with the governor's office, state agencies, local municipalities, California utilities and the private sector, paving the road to solutions that are sustainable and effective.



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SUSTAINABILITY REQUIREMENTS AND GOALS

The governor directed California state agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Additionally, enacted legislation includes sustainability-related requirements of state facilities and operations. Specific references and background on executive orders, legislation, management memos and other requirements or actions are included in five general chapters within this roadmap, as follows:

Climate change adaptation

Zero-emission vehicles

Energy

Water efficiency and conservation

Green operations

These general sustainability initiatives include the following:

- GHG 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

SUSTAINABILITY BACKGROUND REFERENCES

The following executive orders, Management Memos, legislative actions, resources and guidance documents provide the sustainability criteria, requirements, and targets tracked and reported herein.

Executive Orders

The governor issued the following executive order relevant to chapters of this roadmap:

- **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 ensure at least 25 percent of replacement fleet vehicles are ZEVs.

- **Executive Order B-18-12**

  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 on-site 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. Agencies annually report current energy and water use into the Energy Star Portfolio Manager (ESPM).

- **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. Governor Brown 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**

  In 2015, the governor issued EO B-30-15, which 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 GHG emission reduction target of 40 percent below 1990 levels by 2030 and reaffirms California's intent to reduce GHG 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. 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 both build climate preparedness and reduce GHG emissions; prioritize natural infrastructure; and protect the state's most vulnerable populations.

- **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. The California Department of Water Resources (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.

State Administrative Manual & Management Memos

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

- SAM Chapter 1800: Energy and Sustainability
- MM 14-02: Water Efficiency and Conservation
- 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
- MM 15-03: Minimum Fuel Economy Standards Policy
- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 15-06: State Buildings and Grounds Maintenance and Operation
- MM 15-07: Diesel, Biodiesel, and Renewable Hydrocarbon Diesel Bulk Fuel Purchases
- MM 16-07: Zero-Emission Vehicle Purchasing and EVSE Infrastructure Requirements
- MM 17-04: Zero Net Energy for New and Existing State Buildings

Legislative Actions

Several pieces of legislation were signed in 2015-16 that codified several elements of the executive orders, or provided further requirements included in the policies. 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. 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)
- **AB 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)
- **Assembly Bill (AB) 4**: Passed in 1989. The State Agency Buy Recycled Campaign (SABRC) statutes are in Public Contract Code 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 nonrecycled products, and submit plans for meeting the annual goals for purchasing recycled-content products.
- **AB 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 GHG by 2030 and 80 percent reduction by 2015.
- AB 2583 (Blumenfield 2012) **Public Resources Code §25722.8**: Statute requires reducing consumption of petroleum products by the state fleet compared to a 2003 baseline. Mandates a 10 percent reduction or displacement by Jan. 1, 2012 and a 20 percent reduction or displacement by Jan. 1, 2020.

Action Plan

- **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.

State Resources and Guidance Documents

California has invested significant resources in understanding the risks of climate change, water efficiency, strategic growth, and state 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.
- **Planning and Investing for 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 a 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.
- **Water Use Reduction Guidelines and Criteria**: Issued by the California Department of Water Resources February 28, 2013, pursuant to Executive Order 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 owned, funded or leased facilities. 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.
- Strategic Growth Council (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 SGC to achieve a 10 percent improvement in the Smart Location Score of new leases compared to the average score of leased facilities in 2016.

Table 0: Background References and Applicable Roadmap Chapters

	Climate Adaptation	ZEV	Energy	Water	Green Operation
Executive Orders:					
EO B-16-12		X			X
EO B-18-12		X	X	X	X
EO B-29-15				X	
EO B-30-15	X	X	X		X
EO B-37-16				X	
Management Memos					
MM 14-02				X	
MM 14-05			X		X
MM 14-07			X		X
MM 14-09			X		
MM 15-03		X	X		
MM 15-04			X		X
MM 15-06			X	X	X
MM 15-07		X			
MM 16-07		X			
MM 17-04			X		
Legislative Actions					
SB 246	X				
SB 2800	X				
AB 4					X
AB 32		X			
AB 1482	X				
Action Plans					
2016 ZEV Action Plan		X			
State Resources and Guidance Documents					
Cal-Adapt	X				
California's Climate Change Assessments	X				
Public Resources Code §25722.8		X			
Planning and Investing for a Resilient California	X				
Safeguarding California	X				
Safeguarding CA Implementation Action Plan	X				
Sustainable Groundwater Management Act of 2014				X	

CHAPTER 1 - CLIMATE CHANGE ADAPTATION

Climate Change Risks to Facilities

Executive Order B-30-15 directs state agencies to integrate climate change into all planning and investment, including:

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

For all infrastructure, it is important to assess the risk that a changing climate poses to an asset or project. It is also important to recognize the impact that an infrastructure project has on the surrounding community and the impacts on individual and community resilience (e.g., heat island impacts).

DGS' Project Management and Development Branch (PMDB), in developing the current three State Project Infrastructure Fund (SPIF) projects, will incorporate into the design and performance criteria the analysis of the impact of climate change in relation to the requirements of the California Building Code (CBC), LEED and other executive orders. The types of screening criteria are part of the scoping of a project and are integrated into the project design parameters.

PMDB and the Master Architect team will outline all of the project scope criteria, which considers factors such as the site, building orientation, thermal mass and shading, into the planning and development of the design criteria. The selection of the design-build teams will be based on their proposal to develop the optimal design solution for all the issues of consideration. Some areas of consideration will include:

- Life cycle cost analysis of building materials and building support systems with emphasis on demonstrating how each design proposal has focused on selecting materials and systems that will operate years into the future.
- Evaluation of a triple bottom line analysis of the design proposal's adoption social, environmental and financial perspectives for these impacts on their designs. (This was included in the O Street project.)
- Use of a zero net energy (ZNE) screening process to identify the proposed building design's energy usage intensity and how the design will then achieve ZNE status.

PMDB has developed project criteria documents that outline the requirements for climate change issues as enumerated above.

Understanding Climate Risk to Existing Facilities

Risk from Increasing Temperatures

Under a changing climate, temperatures are expected to increase – both at the high and low end. As a result, facilities may experience higher maximum temperatures and increased minimum temperatures. The following tables list the top five facilities affected by the highest projected increase in average temperatures, and the most extreme heat events.

Table 1.1: Top Five Facilities Most Affected by Changing Temperature

Temperatures are listed in Fahrenheit

Ranked by Highest Average Maximum

Facility Name	Est. Annual Mean Maximum Temperature (1961 – 1990)	Est. Annual Mean Maximum Temperature (2031 – 2060)	Est. Annual Mean Max Temp (2070-2099)	Est. Annual Mean Minimum Temperature (1961 – 1990)	Est. Annual Mean Minimum Temperature (2031 – 2060)	Est. Annual Mean Min Temp (2070-2099)
Riverside Office Building	77.96	83.58	86.92	49.56	54.43	58.20
Fresno Water Resources Building	76.49	81.17	85.02	49.51	54.04	57.92
Hugh Burns State Building (Fresno Office Building)	76.50	81.08	84.89	49.73	54.22	58.08
03 District Office	75.49	80.61	84.50	49.41	54.20	58.10
Redding State Building	75.92	80.23	84.36	51.09	55.34	59.34

Ranked by Highest Average Minimum

Facility Name	Est. Annual Mean Maximum Temperature (1961 – 1990)	Est. Annual Mean Maximum Temperature (2031 – 2060)	Est. Annual Mean Max Temp (2070-2099)	Est. Annual Mean Minimum Temperature (1961 – 1990)	Est. Annual Mean Minimum Temperature (2031 – 2060)	Est. Annual Mean Min Temp (2070-2099)
Ronald Reagan State Building	75.51	79.93	83.54	56.13	60.22	64.01
San Diego State Building	70.69	74.05	77.70	56.75	60.19	64.00
San Diego State Garage	70.69	74.05	77.70	56.75	60.19	64.00
Wadie P. Deddeh State Office Building	71.71	75.29	78.95	56.26	59.85	63.67
Junipero Serra Office Building	74.13	78.09	81.70	56.12	59.89	63.65

Table 1.2: Five 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
Hugh Burns State Building (Fresno Office Building)	106	4.3	28	23.7	55	20.7
Fresno Water Resources Building	106	4.3	28	23.7	55	50.7
Caltrans District 3 Office (Marysville)	104.8	4.3	29	24.7	52	47.7
Riverside Office Building	101.8	4.3	26	21.7	47	42.7
Redding State Building	108	4.3	19	14.7	46	41.7

**Temperatures are listed in Fahrenheit*

Guarding against extreme heat will be an important challenge. Increased cooling demands come with the alternate goal of making state buildings energy-neutral. DGS should not simply provide more power to offset the increased cooling needs; improving energy efficiency of existing buildings needs to be a key priority. Increasing the insulation of the building envelope of existing buildings is one way to decrease the heat gain from outside.

Establishing higher set points during the cooling season will also help with addressing high-heat scenarios. Building operators can set higher fan speeds coupled with a one or two-degree increase in the average office building set temperature. These are adjustments to which building occupants may need to adjust. New furnishings and open office layouts will need to be designed to allow airflow distributed across open floors unlike the current compartmentalized tall cubicle layouts of existing state employee spaces.

Another option is for DGS to consider more flexible work schedules to allow earlier start times for employees whose work includes outdoor duties.

The top five facilities with the warmest average temperatures include locations in Fresno, Riverside and Redding. Each location will feel the effects of increased temperature ranges due to their locations in climates that do not have the stabilizing benefits of other DGS locations closer to the ocean.

Although mean temperatures are generally rising, climate change may also bring occasional extreme cold temperatures, placing greater demand on building heating systems. The largest DGS-owned facilities are in traditionally mild climates. Existing structures have not been built to guard against damage from prolonged periods of freezing weather. DGS will need to plan appropriately how best to protect buildings from potential frozen piping and overstressed heating systems.

These top five facilities have high concentrations of business operations employees. The facilities have a higher density of occupants per square foot than other, more purpose-built state buildings with fewer occupants per square foot. More extreme temperature changes will affect a higher concentration of these selected buildings than in other, less dense buildings.

Each of these facilities has been located so that they directly serve the needs of the local population. Moving the operations out of these areas to a more temperate part of the state would decrease the effectiveness of the services provided.

Some of these buildings contain courts, traffic management and state resource management that will continue to perform critical duties in the state's response to climate change.

Structural integrity will be a concern due to the increased expansion and contraction of rigid structural members if a building experiences wider temperature ranges. Part of offsetting this effect will be to increase the building's envelope insulation and to change or adapt exterior finishes to be more heat reflective.

Buildings with high densities of occupants will be the most impacted by an increase in extreme heat events. Building occupants already contribute to cooling demands, and buildings with high occupant densities in combination with large areas of glazing are particularly susceptible to heating extremes. Regions of California that are too far from the coast and located in inland valleys where heat builds during the daylight hours and does not dissipate during overnight hours are particularly susceptible to higher temperatures. These include our top five buildings at risk.

DGS can employ strategies to reduce the impact of changing temperatures:

- Increase building envelope insulation.
- Replace building envelope finishes with more heat-reflective materials.
- Replace glazing with higher performing low-E glazing.
- Add shade structures to south and west building façades.
- Increase tree planting. Find ways to create more shade when providing landscapes to large parking areas and reduce unshaded grass or bare landscape areas.

Rising temperatures mean more energy used during peak times to ensure employees are comfortable and healthy. Increased energy use puts strain on the electrical grid, which can cause blackouts, but it also means higher utility bills and more wear on building systems. When more energy is used, more GHGs are emitted. More people are likely to use automobiles instead of taking alternative forms of transportation. This, coupled with higher temperatures, means formation of ground-level ozone and other secondary air pollutants, resulting in more degradation of air quality.

We chose to look at two different measurements: those buildings that have the top five maximum average temperatures and those that have the five highest minimum average temperatures. Rising minimums should be considered. If the temperatures stay hotter longer, it

takes more energy to cool down for employees. Maximum temperatures are important to note, as more energy will be required to cool. More use of equipment means higher energy use/bills as well as more wear on the machines. Also, by knowing which buildings are likely to be in increasing temperature zones, alternative technologies can be applied.

Fresno and upstate Redding and Marysville look to have the highest maximum temperatures by the middle of the century, with roughly 5-degree increases. Likewise, the San Diego area and other coastal areas will have the most significant increases in minimum temperatures with a 4-degree increase by midcentury.

As with the highest maximum temperatures, facilities that will experience the largest increase in extreme heat events will be in Fresno. Given this information, it is important that Fresno has the most efficient cooling systems, and new technology should be applied to these areas.

The areas listed above will remain the highest suspects for temperature increases by the end of the century. While equipment will need to be replaced several times before then, it is important to forecast temperature increases so the department can budget for equipment replacement that meets increasing cooling loads in these areas.

Risks from Increased Precipitation

Increased precipitation rates can have many effects on DGS facilities, including water infiltration into buildings through roofs, siding, subterranean infiltration, localized flooding and increased ambient air humidity. Uncontrolled water intrusion can cause rusting in steel structural systems, dry rot in wood structural systems and displacement of foundations in soils expanded by moisture. Occupant health becomes a risk when moisture lingers in concealed spaces where dangerous molds develop. Table 1.3 below lists five DGS facilities likely most impacted by projected precipitation changes.

Table 1.3: Facilities that Will Be Most Impacted by Projected Changes in Precipitation

Facility Name	Annual Mean Maximum Precipitation – inches (1961 – 1990)	Annual Mean Precipitation – inches (2031 – 2060)	Percent Change by mid-century	Annual Mean Precipitation inches (2070 – 2099)	Percent change by end of century
Ronald M. George State Office Complex	19.40	23.84	22.88%	25.45	31.20%
Governor Edmund G. “Pat” Brown Building (PUC Bldg)	19.40	23.84	22.88%	25.45	31.20%
Justice Joseph A. Rattigan Building	29.89	35.26	17.97%	38.36	28.35%
Elihu M. Harris Building	19.83	23.34	17.70%	25.20	27.10%
Justice Building	18.25	21.11	15.65%	23.09	26.54%

In addition to being located in areas with the highest increases in annual precipitation rates, the facilities identified in Table 3 have complex architectural configurations that are harder to seal and maintain watertightness.

Facilities most at risk of changing precipitation patterns are those with complex roof structures, internally drained roof structures without exterior overflows, and structures with multiple breaks in the exterior that are dependent on well-maintained sealants and structures with large subterranean areas. Each of these conditions make a building's envelope harder to maintain against failures in critical joints. Each of these conditions will be more susceptible to failure due to the anticipated changes in temperature, which will expand and contract these systems beyond their original design.

Strategies DGS can employ to reduce the impact of changing precipitation start with a more robust system of maintaining building envelopes and replacement of exterior finishes before they fail. This will require the need to have a long-term budget strategy in place that anticipates the expected life cycle of building envelope systems. Beyond the building envelope, DGS facilities can work for facility improvements that capture rainwater to both recharge the ground water table and decrease the facility's contribution of runoff to local flooding.

Buildings can be vulnerable to increases in precipitation. In the future there may be an increase in the risk of collapse, declining health and significant loss of value as a result of more rain or snow storms, subsidence damage, water encroachment, deteriorating indoor climate and reduced building lifetime. In the short term, stronger storms are the greatest challenge.

The DGS facilities most affected by precipitation increase will be those in the San Francisco Bay Area; most will experience a precipitation increase of more than 15 percent by midcentury, and two will experience roughly 23 percent increases. By the end of the century, the increase rises to 25-30 percent. Increased rainfall can cause building enclosure systems' deterioration because of the stress on the building envelope.

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 sea level rise. 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:

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.

Several tools are available to visualize rising sea levels. Cal-Adapt provides information for the San Francisco Bay and Sacramento-San Joaquin Delta. CoSMoS (Coastal Storm Modeling System), a model developed by the U.S. Geological Survey (USGS), provides data for larger portions of the California coast. DGS will utilize the tool best suited to its existing and planned facility locations. Table 1.4 below lists the main DGS facility projected to be most affected by sea level rise.

Table 1.4: Facilities at Risk from Rising Sea Levels

Facility Name	Area	Sea Level Rise 0.0 m	Sea Level Rise 0.5 m	Sea Level Rise 1.0 m	Sea Level Rise 1.41 m
Stockton State Building	Delta	N/A	N/A	N/A	.327

Currently there is only one DGS facility at risk of sea level rise from the Delta. This building is also one that has not aged well and has a host of maintenance issues that would require costly measures to repair. DGS will address the risk of sea level rise by either demolishing the existing building and constructing its own new building on the site (taking care to mitigate the sea level rise risks in the new design), or DGS will surplus sale the property and relocate the current state employees to areas outside of the risk zone.

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]).

DGS is actively working to employ natural infrastructure changes to reduce the risks of climate change on our department's facilities.

DGS has been actively reducing large areas of resource-thirsty lawns by replacing them with drought-tolerant native plant species. This reduces the amount of irrigation water and the use of fertilizers and pesticides.

DGS is also actively developing a strategy to locate all information technology services to redundant cloud-based information storage to mitigate the loss of any one localized server location due to flooding, fire or other natural disaster induced by climate change.

DGS operates large surface parking lots. DGS can improve these lots to capture more rainwater with the installation of pervious paving materials in conjunction with the installation of subterranean runoff capture systems to keep rainwater on site. In addition, strategically introducing trees in these areas could reduce the heat island effect of the lots.

Understanding the Potential Impacts of Facilities on Communities

Vulnerable Populations

Certain populations are more susceptible to the effects of changing climate conditions, will have less capacity to recover from changing average temperatures, and have more frequent and severe extreme events. Numerous factors contribute to vulnerability, often in overlapping and synergistic ways. These can include a number of social and economic factors and can be determined by existing environmental, cultural and institutional arrangements. Vulnerable populations can include (but are not limited to): people living in poverty, people with underlying health conditions, incarcerated populations, linguistically or socially isolated individuals, communities with less access to health care or educational resources, or communities that have suffered historic exclusion or neglect.

Departments should consider the populations their facilities serve and that are in close proximity. For example, prisons or state hospitals serve many populations that are considered vulnerable. In other cases, facilities may be located near communities that have characteristics that could contribute to higher vulnerability.

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 a combination of social, economic and environmental factors. While it does not capture all aspects of climate vulnerability, CalEnviroScreeen is one tool that is available and does include several relevant characteristics. In many cases, disadvantaged communities are more likely to suffer under changing climate conditions, including extreme events. The department's facilities located in these communities can contribute to or alleviate the vulnerability of these communities. Table 1.5 below shows CalEnviroScreen scores of DGS facilities located in disadvantaged communities.

Table 1.5: Facilities located in disadvantaged communities

Facility Name	CalEnviroScreen Score	Located in a disadvantaged community? Yes/No
STOCKTON STATE BUILDING	96-100%	Yes
HUGH BURNS STATE BUILDING (FRESNO OFFICE BLDG)	96-100%	Yes
RIVERSIDE OFFICE BUILDING	96-100%	Yes
PRINTING PLANT	96-100%	Yes
STATE RECORD CENTER WAREHOUSE	91-95%	Yes
JUNIPERO SERRA OFFICE BUILDING	91-95%	Yes
STATE CAPITOL	86-90%	Yes
JESSE M. UNRUH BUILDING	86-90%	Yes
STANLEY MOSK LIBRARY AND COURTS BUILDING	86-90%	Yes

LEGISLATIVE OFFICE BUILDING	86-90%	Yes
WARREN-ALQUIST STATE ENERGY BUILDING	86-90%	Yes
REHABILITATION BUILDING	86-90%	Yes
GREGORY BATESON BUILDING	86-90%	Yes
EMPLOYMENT DEVELOPMENT DEPARTMENT ANNEX	86-90%	Yes
PAUL BONDERSON BUILDING (AKA: WRCB BLDG.)	86-90%	Yes
RESOURCES BUILDING	86-90%	Yes
PERSONNEL BUILDING	86-90%	Yes
EMPLOYMENT DEVELOPMENT DEPT OFFICE BUILDING	86-90%	Yes
JUSTICE BUILDING – SACRAMENTO	86-90%	Yes
DEPT OF JUSTICE DAY CARE CENTER	86-90%	Yes
SECRETARY OF STATE BUILDING COMPLEX	86-90%	Yes
LIBRARY AND COURTS II	86-90%	Yes
OFFICE BUILDING 8 AND 9	86-90%	Yes
LEGISLATIVE GARAGE - LOT 50	86-90%	Yes
SACRAMENTO STATE GARAGE-FLEET LOT 2	86-90%	Yes
ARCHIVES PARKING SITE-FLEET LOT 55	86-90%	Yes
BLUE ANCHOR BUILDING	86-90%	Yes
DGS SACRAMENTO WAREHOUSE	86-90%	Yes
RONALD REAGAN STATE BUILDING	86-90%	Yes
VAN NUYS STATE BUILDING	86-90%	Yes
03 DISTRICT OFFICE	81-85%	Yes
SAN DIEGO STATE BUILDING	81-85%	Yes
SAN DIEGO STATE GARAGE	81-85%	Yes
SANTA ANA OFFICE BUILDING	76-80%	Yes
FRESNO WATER RESOURCES BUILDING	76-80%	Yes

Thirty-five of 53 DGS owned buildings (68 percent) are in disadvantaged communities.

DGS-owned buildings contain many agencies that serve the community, including managed health care, social services, resource management agencies and more. They provide both direct public access and indirect access through the phone and internet-supported services housed in DGS-owned buildings. Most DGS-owned buildings in these disadvantaged communities have high densities of professional staff whose presence in these communities provides a stimulus to the local economy and provides the services mentioned above.

Of the 36 DGS-owned properties that are located in disadvantaged communities, four of them score the highest using the CalEnviroScreen tool, and 31 properties are in a percentile higher

than 86 percent. It is challenging for DGS to control the actions of all of these properties, as a majority of the DGS-owned properties are occupied by other state agencies; therefore, community interaction is often left up to the tenant agencies. DGS is very supportive of community programs and works hard with its Small Business and Minority programs to reach as much of California as possible.

Since the majority of DGS buildings are located in disadvantaged communities, it is likely that extreme weather events that impact those communities could have an effect on the buildings. For example, during extreme heat events, the public may seek shelter in state buildings, especially in places such as Fresno that predict a jump from 4.3 extreme heat days to 28 by midcentury, a 24 percent increase. Where possible, state buildings should assist the public during these extreme weather events. At the very least, DGS should be a resource to staff and the community on climate change and how to respond and recover from climate-related risks.

Urban Heat Islands

Urban heat islands are areas with localized spikes in temperature that 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 through tree planting and other greening measures, cool roofs (e.g., lighter roofing materials that reflect light), cooler pavements and other measures. Table 1.6 below lists the urban heat island index for DGS facilities ranked in order of those most impacted.

Table 1.6: Facilities Located in Urban Heat Islands

Facility Name	Urban Heat Island Index
RIVERSIDE OFFICE BUILDING	30,785.00
VAN NUYS STATE BUILDING	24,921.90
FRESNO WATER RESOURCES BUILDING	7,912.00
HUGH BURNS STATE BUILDING (AKA: FRESNO OFFICE BLDG)	7,695.60
JUNIPERO SERRA OFFICE BUILDING	7,363.46
RONALD REAGAN STATE BUILDING	7,363.46
PRINTING PLANT	6,871.11
STOCKTON STATE BUILDING	6,677.90
STATE CAPITOL	6,602.71
JESSE M. UNRUH BUILDING	6,602.71
STANLEY MOSK LIBRARY AND COURTS BUILDING	6,602.71
LEGISLATIVE OFFICE BUILDING	6,602.71
AGRICULTURE BUILDING	6,602.71
BUILDINGS AND GROUNDS HEADQUARTERS	6,602.71
PAUL BONDERSON BUILDING (AKA: WRCB BLDG.)	6,602.71
RESOURCES BUILDING	6,602.71
PERSONNEL BUILDING	6,602.71

JUSTICE BUILDING - SACRAMENTO	6,602.71
DEPT OF JUSTICE DAY CARE CENTER	6,602.71
SECRETARY OF STATE BUILDING COMPLEX	6,602.71
LIBRARY AND COURTS II	6,602.71
LEGISLATIVE GARAGE - LOT 50	6,602.71
SACRAMENTO STATE GARAGE-FLEET LOT 2	6,602.71
BLUE ANCHOR BUILDING	6,602.71
JUSTICE BUILDING	6,578.16
CAPITOL AREA EAST END COMPLEX	6,517.90
CAPITOL AREA EAST END COMPLEX	6,517.90
BLOCK 224 PARKING GARAGE - LOT 14	6,517.90
FRANCHISE TAX BOARD	6,435.69
REHABILITATION BUILDING	6,368.03
EMPLOYMENT DEVELOPMENT DEPARTMENT OFFICE BUILDING	6,368.03
BOARD OF EQUALIZATION	6,090.08
CENTRAL HEATING AND COOLING PLANT	6,090.08
WARREN-ALQUIST STATE ENERGY BUILDING	6,090.08
GREGORY BATESON BUILDING	6,090.08
EMPLOYMENT DEVELOPMENT DEPARTMENT ANNEX	6,090.08
OFFICE BUILDING 8 AND 9	6,090.08
ARCHIVES PARKING SITE-FLEET LOT 55	6,090.08
DGS SACRAMENTO WAREHOUSE	6,090.08
MISSION VALLEY STATE BLDG.	4,871.54
SANTA ANA OFFICE BUILDING	4,529.50
JUSTICE JOSEPH A. RATTIGAN BUILDING	3,975.45
STATE RECORD CENTER WAREHOUSE	3,571.54
ALFRED E. ALQUIST BUILDING (AKA: SAN JOSE STATE BLDG.)	2,764.76
ELIHU M. HARRIS BUILDING	2,744.69
SAN DIEGO STATE BUILDING	2,689.43
SAN DIEGO STATE GARAGE	2,689.43
WADIE P. DEDDEH STATE OFFICE BUILDING	2,579.00
57	1,705.60
GOVERNOR EDMUND G. "PAT" BROWN BUILDING (AKA: PUC BLDG)	1,390.73

All existing DGS buildings are required to have original roofs replaced with cool roofs. Many existing DGS buildings, including those in Riverside and Van Nuys, have light-colored or reflective roofing. Most existing surface lots owned by DGS have current or future plans for replacement with urban infill projects that will be replaced with office buildings with cool colored reflective roofs, or in some cases, vegetative roofs. DGS concluded a project converting part of a the LA Expo Parkway parking area into a subterranean parking structure with a park and sports facilities above. The project's soccer field was completed and turned over to Expo Park management, while garage construction is still underway. DGS is also demolishing the

existing printing plant building and parking lots and preparing to site a new 1.3 million square foot office complex that will replace the existing heat island effect of the current site with cool-colored reflective and vegetative roof buildings, shade structures and the reintroduction of more trees.

Understanding Climate Risk to Planned Facilities

DGS is in the process of designing and constructing two significant office building projects within the downtown Sacramento urban core area. The O Street Project is a 372,000 square foot high-rise office building and the P Street Project is an 800,000 square foot high-rise office building. DGS will own and operate the buildings upon completion of construction; however, each building will be occupied by state agencies and departments other than DGS.

Risk from Increasing Temperatures

In order to mitigate the risk of increasing temperatures, and to support the state's goals related to energy efficiency, sustainability, and resilience, both buildings are targeting several significant high-performance goals, including: exceeding Title 24 Energy Code requirements by at least 15 percent, achieving zero net energy (ZNE), gaining LEED Platinum certification, and maintaining an Energy Use Index (EUI) less than 30 kBtu/sq. ft./yr. Both buildings will be connected to the state's high-capacity, energy-efficient and resilient Central Utility Plant for primary cooling and heating services.

Specific to addressing the temperature increases noted in the tables below, both buildings will have high-performance exterior envelope assemblies (walls, windows and roofs) focused on increased insulation, tuned glazing, reduced thermal bridging, and external shading of windows with high solar exposure. Trees, overhangs, and canopies will be provided to further protect spaces at the ground level. Such measures will significantly reduce the heat transq. ft.er into the buildings due to current and projected future climate conditions. Building cooling load calculations used to determine heating, ventilating and air conditioning (HVAC) system capacities will be calculated based on American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) climactic data using the 0.1 percent incidence values to account for extreme heat events. The HVAC systems will be designed and constructed to be flexible and scalable to allow future expansion and modification to address increases in building cooling and heating needs. Zoning and control will be interior/exterior and by exposure to allow the HVAC systems to efficiently and accurately react to all climatic conditions. HVAC and electrical infrastructure (such as piping and duct system mains, primary fans, and electrical services) will be designed with up to 25 percent spare capacity to allow future increases in cooling without significant system redesigns. The following tables show projected climate change risks of two new DGS projects under design.

Table 1.7: Climate Risks to New Facilities

Facility Name	Annual Mean Maximum Temperature (1961 – 1990)	Annual Mean Maximum Temperature (2031 – 2060)	Annual Mean Minimum Temperature (1961 – 1990)	Annual Mean Minimum Temperature (2031 – 2060)	Annual Mean Maximum Precipitation (1961 – 1990)	Annual Mean Precipitation (2031 – 2060)
O Street Project	74.2	79.0	49.5	53.7	18.7	21.7
P Street Project	74.2	79.0	49.5	53.7	18.7	21.7

Temperatures are listed in Fahrenheit

Table 1.8: Extreme Heat Events and New Facilities

Facility Name	Extreme heat threshold (EHT)*	Average number of days above EHT (1961-1990)	Average number of days above EHT (2031-2060)	Average number of days above EHT (2061-2099)	Increase in number of days above EHT by 2099
O Street Project	103.9	4.3	20	37	33.7
P Street Project	103.9	4.3	20	37	33.7

**Temperatures are listed in Fahrenheit*

Both planned building projects will be constructed within the downtown Sacramento urban core area, which meets the criteria for both a disadvantaged community and an urban heat island as noted in the table below. Layered landscaping designs consisting of native and adapted planting and new tree canopies are planned for exterior spaces adjacent to both buildings to reduce urban heat island effects. Additionally, both buildings will be constructed with high-reflectivity roofing materials to further reduce the heat island effects of the sites. Both projects will also include street-level plazas and marketplaces to enhance government transparency, engage the community, and connect the building occupants to the urban experience. Street-level space accessible to the community will include a conference center, auditorium, retail spaces, food service kiosks, and seating and dining areas. Table 1.9 below shows both new projects under design will reside in disadvantaged communities and heat island impacted areas.

Table 1.9: New Facilities and Disadvantaged Communities and Urban Heat Islands

Facility Name	Located in a Disadvantaged Community (yes/no)	Located in an urban heat island (yes/no)
O Street Project	Yes	Yes
P Street Project	Yes	Yes

Risk from Changes in Precipitation

As both planned building projects are located within the downtown Sacramento urban core area, neither are at risk from changes in precipitation.

Risk from Sea Level Rise

As both planned building projects are located within the downtown Sacramento urban core area, neither are at risk from rising sea levels.

Natural Infrastructure

EO B-30-15 also directs agencies to prioritize 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]).

The enhanced landscaping designs for the two new downtown Sacramento projects will provide additional shading for the buildings while also reducing urban heat island effects and mitigating the effect of high heat days within the immediate area of the landscaping.

Full Life Cycle Cost Accounting

The DGS Project Management Development Branch (PMDB) and its project teams consider life cycle assessment of each project's building systems. PMDB staff consider initial as well as long-term operating costs of facilities, while meeting environmental impact reduction goals. Some building systems, such as HVAC, have a normal life span of 15-20 years before needing replacement, so climate change anticipated within the system life span must be considered.

Building envelope design, such as building insulation and exterior finishes, generally have a much longer life span, and it's in the state's best interest to invest in well-insulated, durable building envelope components that can perform well in future climate change scenarios.

Both planned building projects are being designed and constructed using the design-build project delivery process. A significant component of this project delivery method is to use life cycle cost analysis (LCCA) to make informed design, construction and operations decisions. Using a 50-year design standard, multiple options and alternatives will be evaluated using LCCA methods throughout the design and construction process. Those options deemed to support the life cycle cost goals of each project will be incorporated into the project.

Integrating Climate Change into Department Planning and Funding Programs

EO B-30-15 extends beyond infrastructure to broader planning efforts. The following tables indicate DGS planning efforts and how they implement climate change.

Table 1.10: Integration of Climate Change into Department Planning

Plan	Have you integrated climate?	If no, when will it be integrated?	If yes, how has it been integrated?
DGS Strategic Plan	No	2019	

Table 1.11: Engagement and Planning Processes

Plan	Does this plan consider impacts on vulnerable populations?	Does this plan include coordination with local and regional agencies?	Does this plan prioritize natural and green infrastructure?
ZEV Action Plan	Yes	Yes	Yes

Table 1.12: Climate Change in Funding Programs

Grant or funding program	Have you integrated climate change into program guidelines?	If no, when will it be integrated?	Does this plan consider impacts on vulnerable populations?	Does program include coordination with local and regional agencies?
Water Conservation Grant	Yes		Yes, facilities in drought and vulnerable locations were given extra consideration	Yes, DGS directed departments to work w/locals for incentive funding

Measuring and Tracking Progress

DGS has measured and tracked progress toward meeting its climate and sustainability goals for the past 15 years. DGS has tracked greenhouse gas emissions since 2006 or earlier, and records it in The Climate Registry's Climate Registry Information System (CRIS) database. DGS has reduced its departmentwide greenhouse gas emissions 57 percent since 2010. DGS also measures and tracks its vehicle fuel consumption.

Energy use has been measured back to 2003 for a baseline, tracked annually since 2010, and recorded since 2013 in the Energy Star Portfolio Manager database. DGS has reduced total energy use 16.6 percent between 2003 and 2016, even with its building portfolio growing 14.3 percent since then.

Water use was measured in 2010 for a baseline and tracked annually and recorded in the Energy Star Portfolio Manager database since 2013. DGS has reduced its total water use by over 30 percent since 2010.

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.

Heat island effect, extreme heat events and rising temperatures are of most concern for DGS buildings. Rising temperatures mean more energy use and more wear on systems. DGS will monitor systems and will upgrade building energy efficiency measures where possible to stay on target with rising temperatures.

For Sacramento and San Francisco Bay Area buildings, precipitation is a concern. By midcentury, these areas will see an increase in precipitation of at least 15 percent. In the Sacramento area, flooding is always a threat and years that have increasing rainfall will only

raise this risk. Over 60 percent of DGS buildings are in the Sacramento area, so it is important to be prepared for extreme weather events.

The Office of Sustainability has worked with state agencies and DGS divisions to develop policies related to climate change and other sustainability initiatives. These policies can be found in the State Administrative Manual (SAM) Chapter 1800.

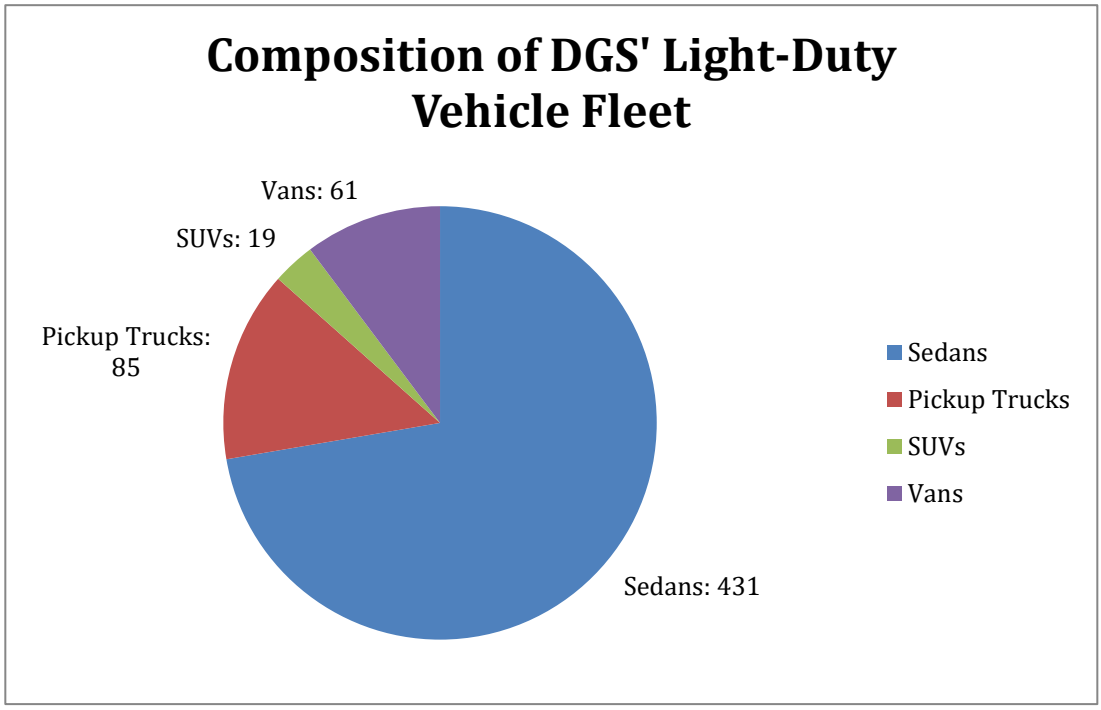
CHAPTER 2 – ZERO-EMISSION VEHICLES

Department Mission and Fleet

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

The DGS fleet is used in a wide variety of ways. Most DGS fleet vehicles prior to January 31, 2018 were used used in the Sacramento State Garage as daily rental vehicles, where they were available for rent on a short-term basis (less than 30 days) by state employees for official business purposes. The daily rental fleet included approximately 200 vehicles of all different types and configurations. However, due to insufficient demand and changing operational needs, DGS discontinued the daily rental services as of January 31, 2018 and converted the daily rental vehicles into long-term leased vehicles for state customers. The majority of DGS' remaining fleet vehicles are used by the DGS Facilities Management (FMD) and Real Estate Services (RESD) Divisions. These vehicles are used by maintenance and construction teams to haul equipment and tools to and from DGS-owned and -managed sites. FMD and RESD operations necessitate vehicles with large cargo and hauling capacity, so the majority of vehicles used for these divisions are pickup trucks and cargo vans. Other typical vehicle types for DGS include shared pool vehicles and delivery vans. Graph 2.1 below illustrates the makeup of DGS light-duty fleet vehicles in 2017.

Graph 2.1: Composition of Department's Light-Duty Fleet



From 2012 to 2016, DGS' fleet mileage per gallon (MPG) has increased from an average of 22 MPG to a current average of 24.81 MPG. Additionally, DGS has reduced its fleet greenhouse gas (GHG) emissions by approximately 10 million pounds from 2012 to 2016. In 2012, the department's GHG emissions totaled 16,773,330 pounds, and in 2016 the total was reduced to 6,875,510 pounds. This reduction is primarily a result of a reduction in the number of vehicles DGS operates, as well as efforts to introduce more fuel-efficient vehicles such as hybrid, plug-in hybrid, battery electric, and fuel-cell vehicles. See Graph 2.2 below for a year-over-year representation of DGS' MPG and GHG changes.

Graph 2.2: Light-Duty Fleet MPG & GHG Emissions

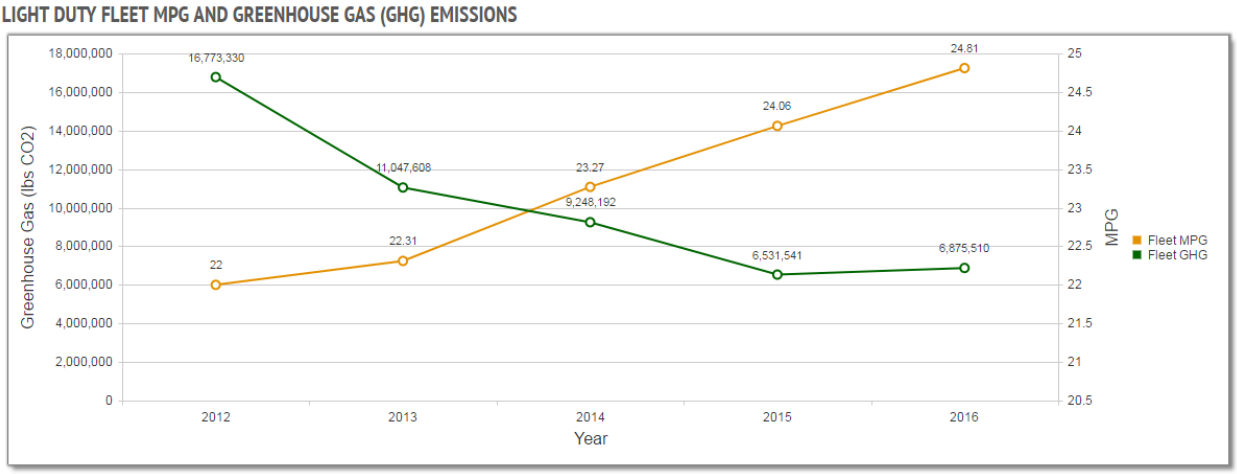


Table 2.1 below lists quantities and costs of DGS fleet fuel purchases.

Table 2.1: Total Purchased Fuel 2015

Purchased Utility	Quantity (in gallons)	Cost ($)
Gasoline	305,281	$952,937
85% ethanol	16,914	$49,846
Compressed natural gas	466	$1,440
Propane	2,447	$7,716
Diesel	281	$891
Renewable diesel	0	$0
TOTAL GHGe	**325,388 gallons**	**$ 1,012,830**

Incorporating ZEVs into the State Fleet

A widespread shift to zero-emission vehicles is essential for California to meet its greenhouse gas (GHG) emission goals. State departments are now required to incorporate larger numbers of ZEVs into their vehicle fleets. Starting in fiscal year 2017-18, the percentage of new light-duty vehicles that must be ZEVs increases by 5 percent each year, reaching 25 percent in 2019-20 and 50 percent in 2024-25.

ZEVs can fill a number of roles within DGS' fleet. Some battery electric vehicles (BEVs) are best used in short run applications due to their limited range. These short run applications could be

pool vehicles that are primarily used by employees of a given building or unit for short trips around town or mail delivery services with short defined routes between DGS facilities in the Sacramento region. With the release of the Chevy Bolt electric vehicle and the 2018 Nissan Leaf, BEVs are increasingly being used in applications that require longer range capabilities. While most BEVs are in the sedan category, there are some larger cargo van and delivery truck BEVs available that can be used for delivery and transport functions.

Plug-in hybrid vehicles (PHEVs) can be used for almost any function that can be performed with a midsize sedan or smaller. Due to the presence of a gas engine, PHEVs don't have the same range and public fueling infrastructure challenges that BEVs have. Some specific applications for PHEVs may be:

- Building managers who have to cover a large geographic area on any given day, but don't have to carry large amounts of equipment.
- Automotive inspectors who are assigned vehicles to travel from site to site in a given region.

While most PHEVs are in the compact and midsize sedan categories, there are some PHEV options coming to the market soon in the minivan and small sport utility vehicle (SUV) categories. These products will likely expand the role that PHEVs can fill in DGS' fleet.

Due to the limited fueling infrastructure for hydrogen, the use of fuel-cell vehicles (FCVs) is restricted to geographic regions with the infrastructure to support the fueling of these vehicles. Currently infrastructure for FCVs exists primarily in the Bay Area and Los Angeles regions. Additionally, the only FCV currently available for sale is the Toyota Mirai, which is a midsize sedan. Specific applications for FCVs are similar to PHEVs; however, the regions in which the vehicles are operated must be outfitted with proper hydrogen fueling infrastructure. While the Mirai is the only FCV currently available for sale, DGS is working with the California Department of Transportation (Caltrans) to establish a lease contract for the Hyundai Tucson FCV, which is an SUV.

Vehicles over specified mileage and age thresholds are eligible for replacement. Currently ZEVs are available on statewide commodity contracts in the subcompact, compact, midsize sedans and minivans vehicle classes. There are currently 90 vehicles in our fleet that are eligible for replacement in vehicle classes for which ZEVs are available on contract. Table 2.2 below shows DGS fleet vehicles currently eligible for replacement.

Table 2.2: Vehicles in Department Fleet Currently Eligible for Replacement

	Compact Sedan	Midsize Sedan	Full-size Sedan	Minivan	SUV (5-passenger)
# of vehicles eligible for replacement	29	26	20	14	1

Table 2.3 below shows the estimated number of ZEVs that have been or are anticipated to be added to the department fleet in coming years.

Table 2.3: ZEV Additions to the Department Fleet

	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Battery electric vehicle	2	0	0	2	5	6	8	9
Plug-in hybrid vehicle	7	5	1	10	12	13	14	14
Fuel-cell vehicle	0	4	0	2	3	3	3	5
Percent of total purchases	14%	50%	N/A*	20%	25%	30%	35%	40%
Required ZEV percentage	10%	10%	10%	15%	20%	25%	30%	35%
Total number of ZEVs added to the fleet	9	9	1	14	20	22	25	28
Total number of ZEVs in fleet	24	33	39	40	54	70	90	105

*In fiscal year 2016-17, DGS was not subject to the ZEV requirement as DGS only requested to purchase eight light-duty assets for its operated fleet. However, of the eight vehicles requested, three were sedans and of those sedans, DGS purchased one PHEV and two hybrids.

Telematics Plan

Telematics is a method for monitoring vehicle use. Using GPS and onboard diagnostics, telematics provides valuable information that often results in fuel savings and improved vehicle utilization. Telematics is especially important for verifying that plug-in hybrid vehicles are maximizing the use of electric fuel rather than gasoline. The requirement that 50 percent of ZEVs purchased must be BEVs is not in place for fleets making use of telematics for all ZEVs.

To better capture real-time usage data and to alleviate the workload associated with vehicle usage reporting, DGS intends to install telematics on all of its fleet assets. By installing telematics on all vehicles, DGS will be able to conduct real-time utilization analyses and adjust usage accordingly to ensure maximum efficiency of our fleet assets. In addition, telematics will allow DGS to ensure that ZEVs are being charged/fueled appropriately and, if not, to take corrective measures. DGS is currently working with Caltrans to solicit for a statewide telematics solution contract. Once executed, DGS intends to install this technology on all of its fleet assets.

Public Safety Exemption

DGS does not employ sworn police officers or emergency responders; therefore, we do not qualify for the Public Safety Special Performance exemption.

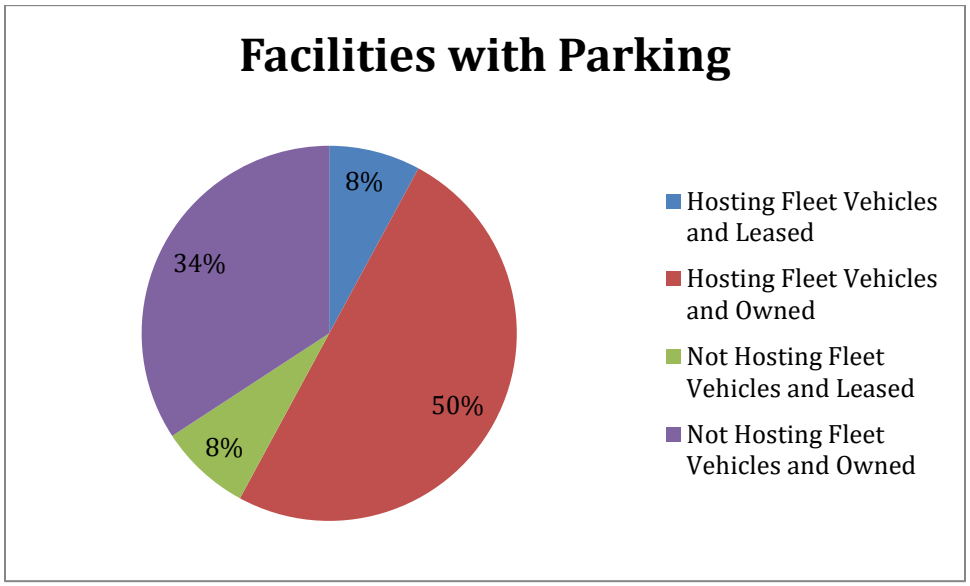
Department of General Services Parking Facilities

DGS serves as the real estate and facilities management branch of state government. As such, DGS owns, operates, and maintains 56 facilities with 16,185,371 square feet of single and multi-tenant office space throughout California. To support the tenants of these buildings, DGS also operates and maintains attached and standalone parking facilities. Here are some details on DGS' parking facilities:

- DGS operates 38 standalone and attached parking facilities throughout the state.
- Parking facilities range from small surface lots to large multi-tenant parking structures.
- Of the 38 parking facilities, 31 are owned and seven are leased.
- Thirteen of the parking facilities have 450 dedicated fleet parking stalls.
- Nine parking facilities have 1,260 dual-use employee/fleet parking stalls.
- There are a total of 9,338 employee parking stalls and 817 public parking stalls in the 38 facilities.

Graph 2.3 below shows percentages of DGS facilities that include parking for fleet or employee vehicles.

Graph 2.3: Parking Facilities



Given the nature of the department's fleet operations and the length of stay for visitors and employees, the composition of electric vehicle chargers (Level 1-L1, Level 2-L2 or DC Fast Charging -DCFC) needs to be optimized to service the demand for charging in an economical and sustainable manner. This guideline was established as a result of a survey with State Equipment Council fleet managers, but this ratio will ultimately need to be deferred to the advice and expertise of individual fleet managers and may be reevaluated over time. As a general guideline, approximately 75 percent of chargers in employee parking areas and up to 25 percent of chargers in fleet parking areas should be L1. Approximately 25 percent of employee chargers and 75 percent of fleet chargers should be L2. This policy will be revisited as we get more market feedback and cost information.

Based on estimates of future ZEV fleet purchases and a count of visitor and workplace parking spaces, it has been determined that DGS will need 462 L1 and 455 L2 chargers to adequately serve fleet vehicles and achieve the goals established in the ZEV Action Plan.

To determine the priority order for electric vehicle (EV) charging installation, DGS calculated the total number of EV chargers that would be needed based on the governor's goal of 5 percent workplace charging availability and subtracted what is currently installed at the facilities. The facilities with the most urgent need for EV charging are listed in Table 2.4 below.

Table 2.4: High-Priority EVSE Projects

Facility Name	Total Parking Spaces	Existing L1 Chargers	Existing L2 Chargers	Total L1 Chargers Needed	New L1 Chargers Needed	Total L2 Chargers Needed	New L1 Chargers Needed
Lot 14 (CADA)	720	0	8	27	27	9	1
Lot 24 (Bonderson)	577	0	4	22	22	7	3
Lot 43 (East End)	1421	0	18	53	53	18	0
Lot 55 (8th & Q)	532	0	5	20	20	7	2
Lot 50 (Posey's)	776	8	13	29	21	10	3
Total	4026	8	48	151	143	51	9

Outside Funding Sources for EV Infrastructure

DGS is pursuing various funding sources for EVSE installation, including but not limited to: DGS internal funds, budget change proposal (BCP) for funds, utility incentives, EVgo (privately run charging stations), Volkswagen settlement funds, and California Energy Commission grants.

Hydrogen Fueling Infrastructure

DGS currently has four hydrogen fuel-cell vehicles (FCVs) in its fleet and all four are domiciled in the Sacramento region. One vehicle is used as a pool vehicle at the DGS headquarters building and three are deployed in DGS' daily rental fleet at the downtown Sacramento State Garage. In the Sacramento region there is only one hydrogen fueling station available. The station is located at:

- 1515 South River Road, West Sacramento, CA 95691

While there is only one hydrogen fueling station in the Sacramento region, DGS has plans to purchase and install a portable hydrogen fueling station at the Sacramento State Garage, that will provide fueling service to the three FCVs in the daily rental fleet.

Outside of the Sacramento region, there may be opportunities to deploy more FCVs at DGS facilities in the Bay Area and Los Angeles regions, where there is a high concentration of commercial hydrogen fuel stations.

Comprehensive Facility Site and Infrastructure Assessments

Site assessments are performed to establish the cost and feasibility of installing needed EV infrastructure. Table 2.5 below lists the facilities that have been evaluated through site assessments and where installations of Electric Vehicle Service Equipment (EVSE) have already been completed.

Table 2.5: Results of Site Assessments

Facility Name	L1 EVSEs Assessed	L2 EVSEs Assessed	L1 EVSEs Installed	L2 EVSEs Installed
2135 Akard Avenue, Redding	10	0	10	0
703 B Street, Marysville	18	0	18	0
2440 Main Street, Red Bluff	10	0	10	0
455 Golden Gate Avenue, San Francisco	62	2	62	2
1515 Clay Street, Oakland	24	8	24	8
505 Van Ness Street, San Francisco	12	9	12	9
2550 Mariposa Street, Fresno	30	6	30	0
3374 E. Shields Avenue, Fresno	6	2	6	0
4949 Broadway, Sacramento	50	14	0	14
450 N Street, Sacramento	30	8	30	8
1500 10th Street, Sacramento	30	2	30	0
1616 Capitol Avenue, Sacramento	28	5	28	0
800 Q Street, Sacramento	28	0	28	0
1500 11th Street, Sacramento	16	5	16	5
1501 Capitol Avenue, Sacramento	21	5	21	0
1517 11th Street, Sacramento	40	6	40	6
1517 13th Street, Sacramento	40	0	40	0
1615 Capitol Avenue, Sacramento	42	0	42	0
1300 I Street, Sacramento	54	16	54	0
1500 Capitol Avenue, Sacramento	18	8	18	0
344 N. 7th Street, Sacramento	21	2	21	0
1304 O Street, Sacramento	6	0	6	0
625 Q Street, Sacramento	5	1	5	1
1100 P Street, Sacramento	16	0	16	0
1220 N Street, Sacramento	6	0	6	0
345 W Ash Street, San Diego	8	8	8	8
San Diego State Office Building	16	0	16	0
Caltrans District 11	53	0	53	0
Mission Valley	42	22	42	22
Riverside Forensic Laboratory	4	0	4	0
Van Nuys State Office Building	17	0	17	0
Junipero Serra State Office Building	18	0	18	0
Ronald Regan State Office Building	24	0	24	0
1526 H Street, Sacramento	0	2	0	2
1400 10th Street, Sacramento	0	1	0	1
9644 Butterfield Way, Sacramento	0	4	0	4
1350 Front Street, San Diego	0	13	0	13
7575 Metropolitan Drive	0	22	0	22
4050 Taylor Street, San Diego	0	15	0	15
300 S. Spring Street, Los Angeles	0	12	0	12
320 W. Fourth Street, Los Angeles	0	11	0	11

Facility Name	L1 EVSEs Assessed	L2 EVSEs Assessed	L1 EVSEs Installed	L2 EVSEs Installed
6150 Van Nuys Boulevard, Van Nuys	0	4	0	4
1516 9th Street, Sacramento	0	2	0	2
9645 Butterfield Way, Sacramento	0	14	0	14
804 Marina Bay Parkway, Richmond	0	36	0	36
31 E. Channel Street, Stockton	0	4	0	0
50 D Street, Santa Rosa	0	2	0	0
1615 Capital Avenue, Sacramento	0	5	0	0
Total	805	276	755	219

EVSE Construction Plan

DGS has committed to serving workplace charging demand in all DGS-owned parking facilities, budget permitting, by 2022. DGS has currently conducted approximately 1,059 site assessments at DGS-owned facilities. Of these assessments, most locations are feasible for EVSE installation. In 2018, 197 L2 chargers have already been installed and more than 50 more are under construction to be completed this year. DGS has over 800 L1 changers under construction or in service. A mix of DGS staff and A&E consultants conducted the site assessments. The installations are public works projects by outside contractors, but DGS staff will provide construction management and inspection.

DGS has had a BCP approved to create a ZEV program open to all state departments, wherein DGS provides preliminary site assessments, full site assessments, architecture and engineering, construction, commissioning and activation.

EVSE Operation

Currently DGS manages the majority of its EVSE through the centralized ChargePoint network, but is actively exploring other service providers. DGS has 103 L2 chargers linked to the network and can collect and report on EVSE usage data. Additionally, through the terms of the purchase agreement, ChargePoint provides regular maintenance on their EVSE and provides updates via the internet to its software. The DGS OFAM manages this network of chargers and is the central data aggregation and reporting entity for DGS. OFAM is also the entity responsible for setting EV parking policies for all DGS-owned facilities. A copy of the EV parking policies can be found here: https://www.documents.dgs.ca.gov/ofa/parkinglots/ZEVpolicy.pdf.

While a fee has been established and implemented on L2 chargers in DGS parking facilities, the fee is not intended to fully cover cost; rather, it is intended to foster adoption of EVs by ensuring that the L2 chargers are available for those who need them most. DGS has found that when no fee is applied to the L2 chargers, the chargers are constantly used by a small handful of current EV drivers – leaving little charging availability for those thinking of purchasing an EV. However, when a small fee is applied, the availability of the L2 chargers increases, giving potential adopters of EVs more confidence that they will have workplace charging ability, if needed. While DGS does set a fee for L2 chargers, DGS is installing over 800 L1 outlets that will be free.

CHAPTER 3 – ENERGY

ENERGY REPORT: DGS Mission and Built Infrastructure

- DGS serves the state as its business manager. DGS' mission is:
  "Deliver results by providing timely, cost-effective services and products that support our customers, while protecting the interests of the state of California."
- DGS manages many of the largest state-owned office buildings, including the State Capitol, totaling 16,185,371 square feet. DGS' main energy-consuming facilities include:
  - Forty-nine office buildings totaling 16,465,153 sq. ft.
  - Five parking facilities totaling 960,315 sq. ft.
  - Three non-refrigerated warehouses totaling 148,192 sq. ft.
  - Two central plants totaling 114,455 sq. ft.
  - One state printing plant totaling 323,460 sq. ft.
  - One child care center (Attorney General office building) totaling 4,893 sq. ft.

Table 3.1 below shows total purchased energy quantities and costs of all DGS facilities for 2016, compared with the 2003 baseline year. It does not include steam and chilled water generated and distributed from Sacramento's Central Plant, as the plant's natural gas and energy use (that generates the steam and chilled water for many Sacramento buildings) is already included in the figures below.

Table 3.1: Total Purchased Energy 2016

Purchased Energy	2003 Baseline Quantity	2003 Cost ($)	2016 Quantity	2016 Cost ($)	% Qty. Change	% Cost Change
Electricity	189,969,589 kWh	$ 24,202,126	201,122,849 kWh	$ 25,480,361	+6%	+5%
Natural gas	5,882,622 Therms	$ 3,647,226	3,434,111 Therms	$ 818,839	-42%	-78%
Steam	N/A	$ N/A	14,502,476 Pounds	$ N/A	N/A	N/A
TOTAL	**1,236,438,438 kBtu Site**	**$ 27,849,352**	**1,044,356,851 kBtu Site**	**$ 26,299,200**	**-15.5%**	**-6%**

Table 3.2 below lists the 10 highest energy-using DGS facilities.

Table 3.2: Properties with Largest Energy Consumption

Building Name	Floor Area (ft^2)	Site Energy (kBTU)	Source Energy (kBTU)	Source EUI (kBTU/ft^2-yr)
095 Central Plant*	70,000*	250,867,739*	358,525,375*	5,122**
084 Franchise Tax Board Complex	1,851,786	97,861,924	282,072,035	152
018 Resources Building	658,544	150,216,656	291,792,695	443
051-054 East End Complex	1,083,580	73,873,958	188,233,161	174
001 State Capitol Building	482,250	55,740,740	134,007,783	278
402 San Francisco Civic Center	1,055,105	45,772,302	124,699,033	118
509 Ronald Reagan State Building	787,404	47,045,084	124,189,742	158
036 Secretary of State Building (E/W)	460,170	49,263,899	120,741,282	262
028 Board of Equalization Building	644,293	38,240,370	104,540,007	162
075 Department of Justice Building	354,058	34,761,625	99,145,087	280
Total for buildings in this table*	7,377,190	593,296,039	1,470,164,271	199
Total for all department buildings*	16,165,371	1,029,642,219	2,535,946,219	149
% of totals	46%	58%	58%	

*Central Plant data excluded from totals to avoid double counting energy use that generates steam and chilled water.
**Central Plant energy use includes process loads that generate steam and chilled water for 16 Sacramento buildings.

DGS has made much progress working toward a 20 percent grid-based energy reduction target, even while DGS building portfolio area increased 13 percent. By the end of 2016, DGS had reduced grid-based energy purchases by 15.5 percent. During this same time, DGS EUI was reduced 25 percent.

DGS plans to meet targets for grid-based energy purchases through a combination of energy efficiency projects at DGS facilities, as well as on-site renewable energy generation added at three DGS facilities, one in 2017 and two in 2018.

- The Department of General Services' Five-year Capital Improvement Program (CIP) includes the following proposed projects:
    - Demolition of the existing printing plant and site cleanup for future development of a new office complex
        - This project will demolish the existing printing plant located at 344 North Seventh Street, Sacramento. Demolition will include the removal and abatement of all hazardous materials from the 17.3-acre site in preparation for a new office complex to be built in future years.
        - DGS is managing outside consultant firms for design and construction of all phases for this design-build project in West Sacramento, which will be a leased building. The project is in an existing building, which will be renovated to improve energy efficiency, and is also considering on-site renewable energy.
    - Renovation of the Bateson Building
        - This project will renovate the historically significant Gregory Bateson Building located at 1600 Ninth Street in Sacramento. The Bateson Building contains approximately 215,000 net usable square feet primarily designed for general office use.
        - DGS will manage outside consultant firms for design and construction of all phases for this design-build project.
    - New Richards Boulevard state office complex
        - This will be the second part of the existing printing plant demolition. The project will construct a new office campus of approximately 1 million net usable square feet (1.3 million gross square feet) at the corner of Richards Boulevard and Seventh Street.
        - DGS will manage outside consultant firms for design and construction of all phases for this design-build project.
    - Renovate the Jesse Unruh Building

- This project will renovate and restore the Jesse Unruh Building located at 915 Capitol Mall in Sacramento. This historically significant building constructed in 1929 contains approximately 125,000 net square feet of office space.
- DGS will manage outside consultant firms for design and construction of all phases for this design-build project.

Zero Net Energy (ZNE)

- DGS is in the planning and early design stages for two large office buildings that will be ZNE. The O Street and P Street projects will be ultra-efficient, high-rise to mid-rise office buildings in downtown Sacramento, with site EUIs of 25-30 kBtu/sf The projects are currently being assigned to design-build contractors and are beginning design. Currently, the P Street Project is anticipating providing approximately 400 KW of onsite renewable energy generation. Due to site, building, and grid restrictions, DGS is planning to utilize long-term community renewable generation from a SMUD SolarShares agreement to include these two buildings in the DGS ZNE portfolio.
- By the end of 2017, no individual DGS buildings had achieved ZNE, although over 21 percent of DGS' existing building portfolio area met the ZNE energy efficiency targets in June 2018, and became part of the DGS ZNE portfolio area when renewable energy generation was obtained in early 2018. This is described in more detail below.
- DGS led the development of the policies that required ZNE for state buildings, and developed tools, resources and training for all state agencies.
    - DGS led the development of Executive Order B-18-12, which requires ZNE for new and existing state buildings.
    - DGS developed and issued Management Memo 17-04 that now requires all new projects beginning design after October 2017 to be ZNE. In addition, DGS developed tools, resources and training for use by all state agencies and made these materials all available on an open website: http://www.dgs.ca.gov/dgs/Sustainability/ZeroNetEnergy.aspx
    - All new projects beginning design going forward will be ZNE following cost-effective energy efficiency strategies. New projects already under design by DGS for the Department of Motor Vehicles and the Air Resources Board will be ZNE following cost-effective energy efficiency strategies.
    - DGS analyzed its existing building portfolio in 2018, and determined that 21 percent of its building portfolio area already meets energy efficiency targets for ZNE buildings established in MM 17-04. DGS installed 3 megawatts (MW) of on-site renewable energy generation at the Franchise Tax Board facility, and has 4.1 MW of renewables under contract to be completed by 2018. Additionally, DGS entered into a 5 MW SolarShares agreement with SMUD with a 20-year contract in 2015, and entered into another contract with SMUD for approximately 34 MW more that began January 1, 2018. Combined, these sources will provide more

than 50 percent of DGS' Sacramento portfolio energy from community solar, providing the renewable component for a sizeable portion of DGS energy-efficient buildings to be classified as part of the DGS ZNE Portfolio. DGS is evaluating measures to improve the efficiency of more of its existing building portfolio, to exceed the 50 percent threshold ahead of the 2025 deadline.

Table 3.3 below shows a summary of ZNE buildings in DGS' portfolio or in design in 2018.

Table 3.3: Zero Net Energy Buildings - 2018

Status of ZNE Buildings	Number of Buildings	Floor Area (ft^2)
Existing buildings	19	3,709,471
Buildings in design	2	1,138,102
Buildings proposed for before 2025 (but not yet in design)	0	0
Additional existing buildings planned to be ZNE before 2025	7	5,452,471
Totals for ZNE buildings by 2025	28	10,300,044
Totals for all department buildings By 2025	57	18,515,887
% ZNE by 2025	49 %	56 %

New Construction Exceeds Title 24 by 15 Percent

DGS-owned and major renovations designed since July 1, 2012:

- DGS has not constructed new buildings since early in the 2000s. The most recent major renovation was to the Library and Courts building at 914 Capitol Mall in Sacramento in 2013. This project was designed and bid prior to the 2012 mandate, but under EO S-20-04, it achieved a LEED Silver Certification, and exceeds Title 24 by 15 percent.
- DGS is currently in the development stages of two new office buildings at P and O Streets. The combined square footage for these buildings is 1.1 million square feet. Both projects are being designed to exceed Title 24 by more than 15 percent with a goal of becoming ZNE certified.
- All buildings listed for new construction in the DGS Five-year Capital Improvement Plan noted earlier will be designed to exceed Title 24 by more than 15 percent with a goal of becoming ZNE certified and LEED Silver certified or higher.

Table 3.4 below shows new DGS buildings completed since July 2012, or currently under design. All have exceeded or plan to exceed CA Title 24 by 15 percent or more.

Table 3.4: New Construction Exceeding Title 24 by 15%

Buildings Exceeding Title 24 by 15%	Number of Buildings	Floor Area (ft^2)
Completed since July 2012	1	150,000
Under design or construction	2	1,144,000
Proposed before 2025	4+	1,640,000

DGS is committed to designing all of its projects to exceed Title 24 by 15 percent as a minimum and to go beyond that benchmark with the department's goal to make all new construction meet ZNE standards. Committing to ZNE design for buildings challenges the entire design and construction team on each project to make energy efficiency in the building one of the highest

priority criteria in the project's completion. This ZNE goal then becomes the best insurance that new buildings for DGS meet the EO B-18-12 mandate for exceeding Title 24 by 15 percent.

Reduce Grid-Based Energy Purchased by 20 Percent by 2018

- The Department of Technology's Basic Policy 4819.31, item 13:
    - ETS implemented computer power-saving settings on May 7, 2018. As of July 26, 2018, the power-saving settings have been applied to 3,430 computers (96 percent of all computers) within DGS. One hundred twenty-eight computers were exempted from the power-saving settings in order to facilitate 24/7 support. New computers receive power-saving settings when deployed.
    - The power-saving settings are:
        - Display will turn off in 10 minutes when using the battery, and in 15 minutes when plugged in.
        - The computer will go to sleep after four hours of inactivity, and go into hibernate after eight hours of inactivity.
        - The sleep setting was increased from earlier proposed roadmap settings because more "up" time is needed to perform the required security scan just after 5:00 p.m. The hibernate setting was increased from previous proposed roadmap settings to prevent long startup times when staff resume work during the day.
        - Please note: Computers are being put in to a hibernate state rather than powering them off to support our patching process. A "Wake-on-LAN" method can be used to wake the computer up and apply patches when it is in a hibernate state, but this ability is lost when the machine is powered off. In our tests, the difference in power saving was very small (0.01 kilowatt-hour per day).
    - DGS will use Microsoft System Center Configuration Manager (SCCM) to implement power management on its computing devices.
- Management Memo 14-07 "Standard Operating Procedures for Energy Management in State Buildings" and the associated Standard Operating Procedures:
    - Ensuring all lights and equipment are turned off at the end of each work day.
        - DGS buildings vary in age, size and features. In some buildings, there are effective energy management systems (EMS) and occupancy sensors in the buildings. Other buildings lack EMS and occupancy sensors, and these buildings rely on reminding staff and tenants of their responsibility to turn off lights and save electricity. Building managers check to ensure lights are off before leaving buildings at the end of the work day if they are the last person to leave the building.
        - DGS building managers have monthly meetings with tenants and weekly meetings with staff where they will discuss energy management practices

including office shutdown procedures like turning off the lights and appliances, closing the blinds, closing the windows and doors, etc. Building managers work with tenants to create email reminders as needed.

- DGS building managers refer to Management Memo 14-07 when reminding staff and tenants to utilize Energy Saver mode.

- Energy Star rated equipment is always a requirement of state contracts whenever a particular electronic commodity has an Energy Star certification available.
  - DGS building managers refer to Management Memo 14-07 when reminding staff and tenants to purchase Energy Star equipment whenever practical. DGS procurement contracts always include requirements for Energy Star rated equipment, unless such ratings are not available for some types of equipment, or if such requirements would limit the completion to a sole source.
- Lighting and HVAC electric usage is minimized outside of normal building hours.
  - All building managers work with tenants and staff to follow MM 14-07's standard operating procedures. Some buildings have areas that are open 24 hours a day and seven days a week; for those buildings that are open 6 a.m.-6 p.m., if the tenant needs to use HVAC and lighting outside of those hours, the tenant submits a request to the building manager a week in advance. For buildings without an effective energy management system, building managers or engineers manually turn off and on the HVAC, lighting, etc.
- Building HVAC controls are set to allow for a plus or minus 2-degree fluctuation from the temperature set point.
  - In DGS buildings with effective energy management systems, building managers or engineers set the deadband for a plus or minus 2-degree fluctuation from the temperature set point. Engineering staff does ongoing preventative maintenance to make sure the process is working. In buildings that do not have effective management systems, building managers work with tenants to manage energy efficiently.
- Ensure that buildings take advantage of cool nighttime and morning temperatures.
  - In all buildings with effective energy management systems, cool nighttime and morning temperatures are maximized by effectively utilizing economizer and night flush cycles. The energy management system is programmed for it. In buildings that lack effective energy management systems, building managers or engineers manually adjust fresh air dampers.
  - Buildings use night flush cycles whenever it is beneficial for reducing energy usage.

        - Buildings with ineffective energy management systems present the biggest challenge. These systems are usually dated or broken. DGS is exploring options for EMS system upgrades through energy service companies (ESCOs) to improve efficiency in DGS buildings.
    - Ensure that data centers are operated at the maximum temperature allowed by equipment manufacturers.
        - See analysis and implementation measures below regarding Management Memo 14-09.
    - Ensure that domestic hot water systems are not set hotter than 105 degrees.
        - Buildings with effective management systems have a setting for ensuring domestic hot water systems are not set hotter than 105 degrees, and engineers test this per preventive maintenance schedule. For buildings that do not have effective management systems, building managers or engineers set water heater thermostats manually and then use thermometer gauges to verify temperature. Engineers with calibration tools and gauges manually verify the temperature.
    - Ensure that HVAC ducts, filters and equipment are inspected and maintained at maximum effectiveness.
        - All buildings use a preventive maintenance software system that generates work orders based on the timing intervals programmed for HVAC maintenance. They are programmed according to relevant requirements for the building.
        - All buildings utilize a preventive maintenance software system that is programmed to comply with the local air district's requirements.
    - Ensure that all boilers are tuned up, including a combustion efficiency check, at least twice per year.
        - DGS building managers implement the requirements of their local air district and the preventive maintenance software is programmed to alert users to the local air district's maintenance requirements. For many buildings, this means annual tune-ups for boilers.
        - FMD building managers work in conjunction with local air districts to remain in compliance with their requirements. All work is performed as contracts are executed.
    - Ensure that lights are turned off in all unoccupied rooms.
        - Some buildings currently have occupancy sensors. In buildings that do not, building managers work with tenants in monthly tenant meetings to discuss energy efficiency practices. DGS is investigating the feasibility of adding more occupancy sensors through ESCOs.

- Measure light levels and remove lamps or reduce wattage to provide appropriate light level for the activities in the work area affected and consider adding task lights in order to reduce overhead light levels.
    - A DGS de-lamping project occurred about 10 years ago. More recently, DGS leadership is discussing potential projects such as LED retrofits and energy management system upgrades in DGS buildings.
    - There is no current plan to measure light levels in DGS facilities. DGS leadership is discussing potential projects such as LED retrofits and energy management system upgrades in DGS buildings.
- Replace all incandescent light bulbs and any remaining magnetic fluorescent ballasts in fluorescent light fixtures.
    - Some older DGS buildings have magnetic ballasts and some have T8 ballasts. DGS is looking into potential energy efficiency upgrades at its facilities through ESCOs.
- Install daylight controls on electric lights in any space over 10,000 ft^2 that has skylights or windows.
    - Buildings with effective energy management systems are able to monitor daylight controls. In buildings that do not have effective management systems, building managers and engineers manually adjust for energy efficiency.
    - DGS has not surveyed its buildings to identify spaces near windows that do not have lighting controls, but is planning to explore numerous lighting energy efficiency options utilizing ESCOs.
- Ensure that state employees do not plug in any personal devices other than cell phone and tablet chargers and task lights, and that any personal space heaters, microwaves, refrigerators and coffee makers are removed from the workplace.
    - The State Administrative Manual 1805.3 states: “State employees are prohibited from using personal heaters without the express written consent of the facility manager or an approved reasonable accommodation request.” Building managers work with tenants to enforce this policy, including requiring notes from doctors explaining the reason for accommodating a request for a personal heater.
- Ensure that any new equipment purchased for employee kitchens and break rooms has an Energy Star rating. Strive to replace refrigerators manufactured prior to the year 2000 with more efficient models.
    - The State Administrative Manual 1805.3 includes this requirement.
    - DGS has not taken a formal survey to determine refrigerators in use manufactured prior to 2000, but based on discussions with building managers, the percentage is very low if there are any at all.

        - DGS does not have a solution in place to replace inefficient employee-funded refrigerators at this time.
    - Ensure that all vending machines on-site are certified to Energy Star version 3.0, section 3(B) or are equipped with an after-market occupancy sensor or sales-based energy management hardware.
        - DGS has not taken a survey of vending machines in its buildings to determine which vending machines are Energy Star certified. In many buildings, the tenant owns the vending machines. Building managers work with tenants by sharing energy management best practice information.
    - Ensure that all coffee makers shut off automatically.
        - DGS has not taken a formal survey of coffee makers, but it is likely that all coffee makers in the buildings include automatic shut-off.
    - Ensure that kitchen, break room, and lunch room equipment is cleaned regularly and maintained to optimize efficiency.
        - DGS building managers and custodial supervisors ensure this.
    - Ensure that timers are installed on all equipment including paper shredders, lighted snack vending machines, and water coolers, so the equipment will be turned off automatically during non-working hours.
        - DGS has not taken a formal survey of shredders, vending machines or water coolers to determine automatic shut-off during non-working hours. DGS does not currently have a plan to install timers on water coolers, but can explore that option with ESCOs.
    - Establish an annual email from department directors to educate all employees on the importance of minimizing electrical load.
        - DGS Director Dan Kim sent an email to all DGS employees on September 1, 2017, reminding employees to power down workstations and printers, turn off lights, and close blinds prior to leaving the office.
- Management Memo 14-09 "Energy Efficiency in Data Centers and Server Rooms":
    - All state-owned and leased data centers and server rooms greater than 200 square feet must be operated within the ASHRAE-Technical Committee 9.9, Class A1-A4 guidelines, including operating at temperatures between 73-81 degrees Fahrenheit.
        - **DGS HQ: Server Room, 707 3rd Street, West Sacramento**
            - Server room size: approximately 944 ft².
            - As of 1/19/18, the average server inlet temperature is 65 degrees.
            - Action item: By June 2018, need to raise the temperature a minimum of 8 degrees to 73 degrees.
            - Owner: ETS. Point of contact: Bill.Haubrich@dgs.ca.gov

- **OSP Server Room, 344 North 7th Street**
  - Server room approximate size: 826 ft².
  - As of 1/19/18, the server room temperature is 72 degrees
  - Action item: By June 2018, need to raise the temperature a minimum 1 degree to reach 73 degrees.
  - Owner: OSP. Point of contact: Jean.Delozier@dgs.ca.gov
- **OSP Server Room, 1050 Richards Blvd.**
  - Server room approximate size: 624 ft²
  - As of 1/19/18, the server room temperature is 68 degrees
  - Action item: By June 2018, need to raise the temperature a minimum 5 degrees to reach 73 degrees.
  - Owner: OSP. Temp change through building manager. OSP Point of contact: kenneth.thorsen@dgs.ca.gov

- All state-owned data centers over 1,000 square feet must report their power usage effectiveness (PUE) to the Department of Technology each year.
  - No DGS server room is more than 1,000 square feet.
- All purchases of network switches and routers meet the Energy Efficient Ethernet IEEE 802.3-2012 Section 6 standard.
  - All DGS procurements of network switches and routers meet the Energy Efficient Ethernet Institute of Electrical and Electronics Engineers (IEEE) 802.3-2012 Section 6 standard.
- Virtualization options must be considered when refreshing server equipment or standing up new systems.
  - DGS migrated all physical servers at its primary server room at 707 3rd Street to virtual VMware guest servers by 2015. All new and refreshed DGS applications are evaluated for deployment in a public cloud environment. DGS applications not capable of migrating to a public cloud are implemented at DGS as virtual guests on the VMware ESXi platform.

Governor Brown's grid-based energy purchase 20 percent reduction targets by 2018, relative to a 2003 baseline year:

- DGS' building portfolio increased by 14.4 percent between 2003-2016, yet has decreased its total energy use by 15.5 percent during this same period, reducing its departmentwide Site EUI by 25 percent.
- DGS has included and corrected some energy use data in 2016 missing from Central Plant district energy (steam and chilled water), and is taking measures to ensure clean district energy data moving forward. The department site EUI was 65 in 2016, and DGS is planning a number of energy efficiency upgrades to some of its facilities.

- Over 20 percent of the DGS building area already meets or exceeds the top 25 percent ZNE efficiency EUI targets, and another 34 percent are within the targets with 12 percent or less improvement in efficiency.
- DGS facilities used $25.5M of electricity in 2016, and $0.8M of natural gas, totaling $26.3M. DGS used approximately 6 percent more electricity in 2016 compared with 2003, but significantly decreased its use of natural gas by 42 percent since 2003, combining to reduce overall energy use by 15.5 percent. Even with a significant net energy use reduction, the net energy cost only decreased 6 percent due to the low cost of natural gas. Electricity is still the predominant form of energy used at DGS facilities.

Table 3.5 below illustrates comparisons for energy consumption as well as building area and energy use intensity (EUI) for DGS buildings between 2003 and 2016.

Table 3.5: Departmentwide Energy Trends

Year	Floor Area (ft^2)	Total kBTU Consumption	Department Average Site EUI
Baseline 2003	14,416,016	1,236,438,438	86
2016	16,185,371	1,044,356,851	64
2018 Goal	16,185,371	989,150,750	61

By the end of 2018, DGS plans to further reduce its grid energy use at least an additional 4.5 percent through energy efficiency upgrades and more on-site renewable energy. The 2016 portfolio did not have any on-site renewable generation (off-grid behind the meter), but brought online 3 MW of photovoltaic (PV) electricity at the Franchise Tax Board in 2017, and is scheduled to add another 3.1 MW on-site at two other facilities (Department of Justice and Caltrans District 3). These will combine to further reduce grid-based energy needed for the DGS portfolio by 2018.

- DGS, through its ESCO program, strives to develop comprehensive energy savings projects at its facilities that result in as much energy savings as possible through retrofits to existing building mechanical systems, lighting controls, lighting upgrades, and building envelope improvements. The goal is to save energy, reduce energy costs, extend equipment life, and decrease operations and maintenance costs at DGS facilities.
- DGS has energy savings projects underway or proposed at over half of its 56 facilities. In addition to the traditional ESCO method, DGS is also managing lighting-only projects with a faster completion timeline at several facilities.
- DGS has developed new strategies beyond using ESCOs. DGS works with the utility companies and the California Conservation Corps to quickly complete less comprehensive projects that primarily look at lighting and controls, and DGS is developing agreements so that the utility companies can implement ESCO projects at DGS facilities through their own ESCO programs.
- Due to inconsistent district energy readings and data in previous years, it is difficult to compare energy trends. However, moving forward in 2016 and beyond, DGS is ensuring

accuracy and consistency in energy data from its Sacramento Central Plant (which provides district energy to 75 percent of the DGS portfolio).

Table 3.6 quantifies energy savings and building area of DGS facilities that have undergone energy efficiency upgrades over the past four years.

Table 3.6: Summary of Energy Projects Completed or In Progress

Year Funded	Energy Saved (kBTU/yr)	Floor Area Retrofit (ft^2)	Percent of Department Floor Area
2014	1,375,029	92,101	1%
2015*			
2016	17,926,581	1,404,314	9%
2017	12,508,342	3,698,015	23%

*Data unavailable for 2015

DGS has conducted ASHRAE Level 2 energy surveys in 22 percent of its buildings over the last few years. Level 2 surveys are beginning at eight sites in 2018, with a focus on cost-effective projects for the buildings with high energy uses. These surveys and building areas are quantified in Table 3.7.

Table 3.7: Energy Surveys

Year	Total Department Floor Area (ft^2)	Energy Surveys Under Way (ft^2)		Percent of Department Floor Area (ft^2)	
		Level 1	Level 2	Level 1	Level 2
2014	16,185,371		292,148		2%
2015	16,185,371		2,533,761		16%
2016	16,185,371		611,157		4%

Demand Response

Executive Order 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 that is cost-effective.

- Four DGS facilities in 2016, and 12 in 2017, participated in Pacific Gas & Electric's (PG&E's) Peak Day Pricing, PG&E's Demand Bidding Program, Sacramento Municipal Utility District's (SMUD's) Power Direct Automated Demand Response Program, and San Diego Gas and Electric's Critical Peak Pricing Program. Both the Peak Day Pricing and the Critical Peak Pricing programs are tariff-based, and all buildings are eligible. The two programs provide customers with an opportunity to manage their electric costs by either reducing load during high-cost pricing periods or shifting load from high-cost pricing periods to lower-cost pricing periods. However, the utilities do not provide financial incentives for participation, and the tariff structure is not a good fit for every building. For example, when PG&E last performed an analysis on the DGS Stockton state building, PG&E concluded that it would have significantly higher annual utility bills if it switched over to Peak Day Pricing, so DGS elected not to do so.

- DGS' Elihu Harris building in Oakland received about $33,398 from PG&E's incentives for its eight years of participation in PG&E's Demand Bidding Program (DBP). The building's commitment for participation in DBP was to reduce, on average, up to 309 kW on demand response event days. In 2016, there were 14 demand response events. PG&E ended the DBP program in 2016, and it currently offers the Capacity Bidding Program which requires the ability to shed moderate to significant load when asked. At this time, there are no DGS buildings participating in PG&E's Capacity Bidding Program since the commitment could cause hardship. For example, the Fresno state building's analysis determined that dropping HVAC load would negatively impact occupants on summer days. PG&E continues to evaluate DGS buildings to determine if participation is beneficial and cost-effective. Southern California Edison and San Diego Gas & Electric offer similar Capacity Bidding Programs, and there are no DGS buildings participating in the program at this time due to the likelihood of negative impact.
- Ten DGS buildings participate in SMUD's Power Direct Automated Demand Response Program. In 2017, SMUD paid DGS $17,895 in financial incentives for participating in the program. In order to participate, buildings are required to install technology systems that automatically scale back energy use when demand is highest to effectively reduce energy consumption by at least 20kW for a minimum of two consecutive hours during peak times. SMUD offers financial incentives for installing the automation systems and equipment and offers $3.50/kW per month for a one-year commitment and $5.00/kW per month for a three-year commitment. The 10 DGS buildings all have three-year commitments with SMUD.
- The main challenge for DGS buildings is lacking the technology required for participating in automated demand response programs. The majority of building managers reported they participate in the Flex Alert system, where they receive an email issued by the California Independent System Operator (ISO), a nonprofit, public benefit corporation that operates the high voltage grid in California, asking consumers to conserve electricity during heat waves and other challenging grid conditions. Building managers make adjustments manually in response to the FlexAlert events. To increase participation in automated demand response programs, DGS continues to work with utility account representatives to determine if the utility offers a cost-effective automated demand response program. In addition, DGS continues to seek opportunities to cost-effectively acquire the technology required for automated demand response program participation.

DGS participation in utility demand response programs is quantified in Table 3.8.

Table 3.4: Demand Response

Demand Response Participation	Number of Buildings/Sites	Estimated Available Energy Reduction (kW)
Number of buildings participating in 2016	4	Unknown
Number of buildings that will participate in 2017	12	Unknown
All department buildings (totals)	55	Unknown
All department buildings (percent)	22 %	Unknown

Renewable Energy

DGS has been assisting state agencies in procuring on-site renewable energy generation at state facilities for the past 15 years. Through its Power Purchase Agreement (PPA) program, renewables have been installed at the California Department of Corrections and Rehabilitation (CDCR), Department of State Hospitals, Caltrans, DGS and other facilities. These usually translate into lower energy costs than if they were purchasing directly from the utilities, and no capital costs to the agencies participating. Most of these installations have been for CDCR, with large ground-mounted systems, but DGS started utilizing PPAs to add on-site renewable energy generation at DGS facilities as well, beginning in 2017. These should further reduce our grid energy purchases for DGS facilities by 5 percent by 2018, helping DGS achieve its 20 percent goal by 2018.

- In 2017, DGS installed 3 MW of PVs at the Franchise Tax Board facility through a PPA, which is anticipated to generate 5,500,000 kilowatt hours (kWh) annually. DGS manages a renewable energy program serving numerous state agencies that has installed 44 MW at numerous locations for multiple state agencies, and should have over 100 MW installed by 2020.
- Much of the DGS existing building portfolio is in the downtown Sacramento grid area, which has grid restrictions limiting on-site renewable generation, especially exporting power, as well as very limited land or parking area for renewables. To address this, in 2016, DGS entered into a SolarShares agreement with SMUD for 5 MW of solar panels constructed at its Rancho Seco site dedicated to providing power to a portion of the DGS Sacramento portfolio. On October 30, 2017, DGS entered into another SolarShares agreement with SMUD for another 34 MW of PVs to be added to provide long-term dedicated renewable energy to the DGS portfolio. The new agreement took effect January 1, 2018, and will last 20 years. In addition, DGS has agreements in place that will lead to additional solar installations at three additional DGS sites by the end of 2019, totaling 3.7 MW through PPAs as follows:
    - Department of Justice Building – 2.3 MW by 2018
    - Caltrans District 3 Office Building – 0.8 MW by 2018
    - Caltrans District 11 Office Building – 1.0 MW by 2019
    - A fourth site, the P Street Project, is beginning design and is expected to add at least 0.4 MW once completed in 2020

- The issuance of MM 17-04 mandates that all new projects beginning design after October 23, 2017 will include either on-site renewable energy generation and/or off-site renewable energy generation to achieve these targets.

Table 3.9 shows existing and planned renewable energy for DGS facilities in 2018.

Table 3.9: On-Site & Off-Site Renewable Energy @ DGS Facilities

Status	Number of Sites	Capacity (kW)	Estimated Annual Power Generation (kWh)	Percentage of Total Annual DGS Power Use
On-site renewables in operation or construction	1	3,000	5,500,000	3%
On-site renewables proposed	4	4,100	6,465,700	3%
On-site renewable totals	5	7,100	11,965,700	6%
Departmentwide facility & energy totals	62	7,100	212,319,549	100%
Off-site renewable totals		39,000	83,066,248	39%
Off-site renewables planned		0	0	0%
Off-site renewables combined current & planned		39,000	83,066,248	39%
Current combined on-site and off-site renewable %		42,000	88,566,248	42%
Planned combined on-site and off-site renewable % (by 2020)		46,100	95,031,948	45%

Monitoring-Based Commissioning

California Building Code and MM 15-04 require monitoring-based commissioning (MBCx) when planning and constructing new California public facilities. Besides implementing required MBCx at new facilities, DGS is continuously improving building automation controls (BAC) and energy management and control systems (EMCS) in its existing facilities wherever possible.

DGS owns and operates a performance monitoring analytical platform (PMAP) capable of providing continuous monitoring and real-time fault diagnostics for multiple DGS buildings, including web-accessible dashboards and performance reports. The California Energy Commission building (Sacramento) was the pilot site fully integrated into the platform and it will be continuously commissioned in 2018. Metered utility data from other DGS buildings is automatically transferred directly from the utility servers to the DGS PMAP server. Web accessible performance dashboards will be operational in 2018.

Pending successful demonstration of the PMAP capabilities and identifying funding sources, DGS will prioritize other buildings to be gradually integrated into the platform in conjunction with required building automation and network upgrades.

Table 3.10 below includes DGS buildings surveyed and estimated for a forthcoming MBCx implementation. Some of these facilities may have plans for major renovations, sale or demolition and are not good candidates of MBCx until after improvements are made.

Table 3.50: Planned MBCx Projects (Workbook Tab K)

DGS Facility	Building Name	Location	Sq. Ft.	EMS Make, Model, Installation/Upgrade	EMS Yr	MBCx Capable or Difficult	**Est. MBCx Start	** MBCx Projected Cost ($)
OB-001	State Capitol*	Sacramento	482,250	Ultavist OS23.1 Version 1.2 & Alerton BAC Talk 2.6	2010	Difficult	*	160,000
OB-002	Jesse Unruh*	Sacramento	164,529	Alerton BAC Talk 2.6	2010	Capable	*	80,000
OB-003	Lib-Cts-Annex	Sacramento	188,569	JCI Metasys 5.3.06500	1999	Capable	2021	80,000
OB-004	LOB	Sacramento	240,735	Alerton BAC Talk 2.6	2010	Capable	2022	80,000
OB-006/056	Agriculture/Anx	Sacramento	127,010	Alerton BAC Talk 2.6	2010	Capable	2022	80,000
OB-008	Energy Comm.	Sacramento	142,378	Alerton BAC Talk 2.6	2010	Capable	Operational	80,000
OB-009	CADA	Sacramento	48,139	I-sys	1997	Difficult	2023	120,000
OB-010	DOR	Sacramento	163,350	Alerton Envison BAC Talk	2007	Capable	2022	80,000
OB-011	Bateson*	Sacramento	293,516	Alerton BAC Talk 2.6	2010	Capable	*	80,000
OB-013	EDD Solar*	Sacramento	236,000	Alerton Envison BAC	2012	Capable	*	80,000
OB-016	Bonderson*	Sacramento	131,486	Siebe/Invensys/Siemens BAS	1995	Difficult	*	120,000
OB-017	Office of State Printing*	Sacramento	323,460	JCI Metasys Ver5.1	2011	Capable	*	80,000
OB-018	Water Resources*	Sacramento	658,544	Ultavist	1995	Difficult	*	120,000
OB-021	State Personnel	Sacramento	84,400	Alerton Envison BAC	2012	Capable	2023	80,000
OB-025	EDD HQ*	Sacramento	479,300	Alerton Envison BAC	2012	Capable	*	100,000
OB-028	BOE*	Sacramento	644,293	Tridium Niagara AX framework	2013	Capable	*	100,000
OB-030	Attorney General	Sacramento	367,301	Alerton Envision/ 2.01	2007	Capable	2021	80,000
OB-031	AG Child Care	Sacramento	4,893	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-036	SOS	Sacramento	460,170	Alerton Envision for Back Talk 2.60	2010	Capable	2021	80,000
OB-038	Lib-Cts-Annex	Sacramento	115,000	Alerton Back Talk	2013	Capable	2021	80,000
OB-039,045	Office Bldgs 8,9	Sacramento	628,592	Alerton BAC Talk 2.6	2010	Capable	2021	100,000
OB-049	East-End Education	Sacramento	396,295	Workplace Pro Release 2.Copyright Tridium, Inc.	2007	Capable	2022	80,000
OB-050	LOB Garage Lot-50	Sacramento	224,465	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-051, 2,3,4	East-End Complex	Sacramento	1,083,580	Honeywell EBI, Revision R410.2.	2011	Capable	2023	100,000
OB-057	CalNet	Sacramento	9,600	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-075	DOJ	Sacramento	354,058	JCI Metasys	2009	Capable	2022	80,000

DGS Facility	Building Name	Location	Sq. Ft.	EMS Make, Model, Installation/Upgrade	EMS Yr	MBCx Capable or Difficult	**Est. MBCx Start	** MBCx Projected Cost ($)
OB-084	FTB Complex	Sacramento	1,851,786	Alerton Back Talk, 2.5.	2012	Capable	2022	120,000
OB-095	Central Plant	Sacramento	70,000	Alerton BAC Talk 2.6	2010	Capable	2021	80,000
OB-330	Cal-Towers	Riverside	164,260	Automated Logic Control 4.1.	2010	Capable	2021	80,000
OB-402	RMG Civic Center	San Francisco	1,055,105	Honeywell / EBI	2003	Capable	2020	100,000
OB-418	PUC	San Francisco	290,525	Invensys/Yamas Control	2001	Difficult	2023	120,000
OB-460	Redding State Bldg.	Redding	24,416	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-461	Red Bluff State Bldg.	Red Bluff	28,000	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-470	San Jose SOB	San Jose	107,306	Niagara Workplace. 3.6.31.1	2010	Capable	2022	80,000
OB-480	Santa Rosa SOB	Santa Rosa	97,377	Staefa Control System. Widows 98SE – Circa	2005	Difficult	2022	100,000
OB-509	Ronald Reagan	Los Angeles	787,404	Honeywell Xbsi Front-End (Windows 98)	1991	Difficult	2023	120,000
OB-512	Junipero Serra	Los Angeles	519,101	Delta Control System	1997	Difficult	2023	120,000
OB-520	Santa Ana State Bldg.*	Santa Ana	127,795	Reliable Controls, RC 2006.	N/A	Difficult	*	100,000
OB-530	Van Nuys SOB	Van Nuys	147,495	Barber-Coleman/Signal	1997	Difficult	2022	100,000
OB-602	Elihu Harris SOB	Oakland	758,583	JCI Metasys	1999	Capable	2021	100,000
OB-701	Fresno SOB	Fresno	185,937	Invensys Building Systems-Model UNC 520 Series-	2005	Capable	2022	80,000
OB-753	Fresno Water Res.	Fresno	35,400	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-801	San Diego SOB.	San Diego	171,700	Siemens Insight 3.7	1997	Difficult	2021	100,000
OB-901	Stockton State Bldg.	Stockton	62,850	Scheduled for retrofit	N/A	No EMCS	N/A	N/A
OB-074	State Garage Lot-2	Sacramento	283,050	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-076	Fleet Lot-55	Sacramento	177,500	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-078	Fleet Lot-14	Sacramento	265,100	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-087	OES	Rancho Cordova	117,704	JCI Metasys	2000	Capable	2021	80,000
OB-091	Blue Anchor*	Sacramento	24,900	Alerton Back Talk	2013	Capable	*	80,000
OB-106	State Record Center	West Sacramento	82,682	N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-120	R-Street Warehouse*	Sacramento		N/A no EMS at this location	N/A	No EMCS	N/A	N/A

DGS Facility	Building Name	Location	Sq. Ft.	EMS Make, Model, Installation/Upgrade	EMS Yr	MBCx Capable or Difficult	**Est. MBCx Start	** MBCx Projected Cost ($)
OB-803	San Diego State Garage	San Diego		N/A no EMS at this location	N/A	No EMCS	N/A	N/A
OB-850	Mission Valley	San Diego	242,315	JCI Metasys	2014	Capable	2022	100,000
OB-860	Waddie P Deddeh	San Diego	292,148	JCI Metasys	2011	Capable	2021	100,000
Totals			**16,022,352**	**Sq. Ft.**				**3,880,000**

*Buildings with asterisks are scheduled in DGS' Ten-Year Sequencing Plan to undergo major renovations, or are scheduled to be demolished, sold or replaced. MBCx may be more appropriate to include in major renovation projects of these spaces.

**MBCx costs are based upon estimates in the current MBCx contract that is only funded for the Energy Commission building and expires in 2020. Actual costs may vary, and no buildings are actually scheduled at this time until funding becomes available.

Financing

DGS uses all financing mechanisms available for energy savings projects: operations budgets, revolving loan funds, third-party financing, on-bill financing and on-bill repayment. For the solar projects, DGS uses PPAs. These programs are described as follows:

1. **Operations Budgets**
   - Departments can pay for energy projects out of their operational budgets.
2. **Revolving Loan Funds**
   - Pursuant to Public Resources Code 25400 et seq., DGS manages a revolving loan fund with funds from the CEC's Energy Efficient State Property Revolving Fund. This fund is a method used to finance energy savings projects.
3. **Third-Party Financing**
   - Pursuant to Government Code 14930 et seq., DGS can use the Golden State Financial Marketplace Program ("GS $Mart") Program, the state's centralized financing program available for state agencies to finance certain goods and services, for third-party financing of energy savings projects. Other third-party financing examples include using lenders through the energy contractor or utility company.
4. **On-Bill Financing and On-Bill Repayment (OBF & OBR)**
   - Departments often use On-Bill Financing (OBF) to finance energy projects. On-bill financing allows the utility to incur the cost of the clean energy upgrade, which is then repaid by the customer on the utility bill. On-bill financing allows customers to overcome cost barriers by providing financing for energy savings upgrades, which are then paid over time via charges on their utility bill.
   - On-bill repayment (also known as on-bill lending) options also allow the customer to repay the investment through a charge on their monthly utility bill, but with this option, the upfront capital is provided by a third-party lender, not

the utility, and typically includes interest charges. On-bill lending has been in use for more than 30 years as a means to increase the commitment in clean energy and energy savings improvements.

5. **Power Purchase Agreement**
    - The DGS PPA program is an ideal project delivery model for state agencies and requires no capital outlay funds, no maintenance costs, no operational costs, and no repair or replacement costs from the host agency. The PPA program has no loan repayment requirements or financing terms. DGS has developed a program that allows developers to build, own, operate and maintain clean energy projects at state facilities. Agencies that host projects using the PPA and site license agreement (SLA) contracts have no financial investment requirements and do not need to operate or maintain the system. The developer is responsible for the system and electrical output. The developer recaptures its investment by selling the power back to the facility at a lower cost than the utility charges for the same power. The PPA is a contract between the host facility and the developer to purchase renewable electricity at a rate below traditional utility rates. The SLA is a lease agreement between the host agency, DGS, and the developer. These are both long-term, fixed-price contracts that require the developer to produce reliable and affordable clean energy for the host. The PPA and SLA term is usually written for 20 to 25 years and creates stability in operational budget management due to the fixed cost for electricity and reduces staff resource allocations because the host is not responsible to operate and maintain the system.

CHAPTER 4 – WATER EFFICIENCY AND CONSERVATION

WATER EFFICIENCY AND CONSERVATION REPORT

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 2012-14 were the three 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 (1982-83) in the Sacramento River and San Joaquin River watersheds and close to becoming the wettest year in the Tulare Basin (set in 1968-69). 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 EOs and SAM sections listed in the sustainability background references near the front of the roadmap 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 use by state agencies goes beyond the scope of these EOs, SAM sections and DGS management memos as these documents do not address such related issues as water runoff from landscaping and various work processes, 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.

Department Mission and Built Infrastructure

DGS' mission is to deliver results by providing timely, cost-effective services and products that support our customers, while protecting the interests of the state of California.

The DGS portfolio comprises more than 18 million gross square feet (GSF) of state-owned office space and other facilities statewide, contained within approximately 55 general-purpose state-owned facility sites. The average age of these buildings is around 45 years old, except for the State Capitol building, which is 142 years old. The DGS portfolio is occupied by more than 43,000 (mostly state) employees from many state agencies and from all three branches of state government. Water is used for heating and cooling systems in many of the buildings and for landscape irrigation, as well as for the restrooms, breakrooms and cafeterias inside some of the buildings.

During the drought, DGS took some drastic actions to conserve water, including:

- Cutting the amount of water used in landscaping at DGS properties by 20 percent.
- Shutting off fountains and water features on state property.
- Instituting a moratorium on nonessential landscaping projects at state facilities.
- Cancelling contracts for water-intensive window washing at state facilities.
- Eliminating all car washes in the State Garage other than those required for safety.

Table 4.1 below quantifies the quantity and cost of water purchases for DGS facilities in 2016.

Table 4.6: Total Purchased Water

Purchased Water	Quantity	Cost ($/yr)
Potable	239,746,500	$ 109,250.51
Recycled water	N/A	$ N/A
	239,746,500 Gallons	$ 109,250.51

Table 4.2 below lists the five DGS facilities with the largest water use.

Table 4.7: Properties with Largest Water Use Per Capita**

Building Name	Area (ft^2)	Total Gallons	Total Irrigation in Gallons (if known)	Gallons per Capita
001 State Capitol Building*	482,250	23,982,400	N/A	108
701 Fresno State Building	185,937	3,557,200	N/A	61
461 Red Bluff State Building	28,000	1,065,400	N/A	38
106 State Record Center and WHSE	82,682	78,500	N/A	36
753 Fresno Water Resources Building	35,400	886,900	N/A	31
Total for buildings in this table	1,208,350	29,570,400	N/A	87
Total for all department buildings	16,579,452	239,746,500	N/A	15
% of totals	7%	12%		578%

* State Capitol water use includes irrigation from Capitol Park.

** Does not include facilities with industrial functions (i.e., Central Plant or state printing plant).

Table 4.3 below list five DGS facilities with the largest landscape areas.

Table 4.8a: Properties with Largest Landscape Area

Building Name	Area (ft^2)
Franchise Tax Board, 8645 Butterfield Way, Rancho Cordova CA	1,420,093
Capitol Park, 11th Street, Sacramento, CA	1,169,993
Dept. of Justice, 4949 Broadway, Sacramento, CA	562,110
Mission Valley, 7575 Metropolitan Drive, San Diego, CA	99,860
Caltrans D11, 4050 Taylor St, San Diego, CA	90,294
Total for buildings in this table	3,342,350 ft^2
Total for all department buildings	3,870,484 ft^2
% of totals	86%

In response to the drought, building managers turned off landscape water for a time and as a result, plants and lawns died. Building managers were unsure of when it was considered reasonable to turn the water back on again, and they did not know about the application for exemption from the drought landscaping moratorium. In response to this challenge, DGS posted the application for exemption from the drought landscaping

moratorium on its website and informed agencies of the process. Additional efforts to increase communication with building managers included a quarterly newsletter and presentations on sustainability initiatives at meetings with building managers in attendance.

To promote the governor's water efficiency and conservation goals, DGS has implemented projects such as the Capitol Park permeable paver project, which included a 50 percent lawn reduction at the north, south and west entrance resulting in a 50 percent water reduction. In addition, the Capitol Park east entrance project replaced lawn with low water-use plants and replaced irrigation rotors with drip irrigation.

DGS awarded $10 million in grants to 30 executive-branch departments and District Agriculture Associations for 165 water-saving projects at their facilities. These grant-based projects will save over 300 million gallons of water annually.

One of the public relations efforts that has been implemented is the "Toward a Greener California" brochure. This brochure highlights sustainability efforts that have taken place throughout DGS.

DGS issued a management memo directing state agencies to establish baseline water use at their facilities. Table 4.3 below compares water use in 2016 with baseline years of 2010 and 2013.

Table 4.3: Department-wide Water Use Trends

Year	Total Occupancy /year	Total Amount Used (Gallons/year)	Per capita Gallons per person per day
Baseline year 2010	43,435	284,057,600	18
Baseline year 2013	43,435	317,555,500	20
2016	43,435	239,746,500	15
2020 goal	43,435	≈227,246,080	14

DGS reduced its potable water use by 18 percent in 2016 compared with a 2010 baseline. Much of this reduction occurred through permanent water efficiency upgrades to DGS facility fixtures and irrigation systems during the California drought. Indoor water efficiency projects between 2015-2017 resulted in 910 toilets, 207 urinals, 1,881 faucet aerators, and 113 showerheads being replaced, efforts that are estimated to save nearly 15 million gallons of water each year. The following tables summarize the reductions achieved through various efforts.

Table 4.4: Total Water Reductions Achieved

Total Water Use Compared to Baseline	Total Amount Used (gallons per year)	Annual Gallons Per capita
20% reduction achieved		
Less than 20% reduction	239,746,500	5,475
25% reduction achieved		
Less than 25% reduction achieved		
Totals		
Departmentwide reduction		

Table 4.5: Summary of Indoor Water Efficiency Projects Completed

Building	Water Closets Replaced	Urinals Replaced	Faucet Aerators Replaced	Shower-heads Replaced	Project-ed Gallons Saved/ Yr	Percent Savings	Funding Year
001 – Capital West Wing	40	0	6	2	1,150,000	45%	FY14/15
001 – Capital East Annex	0	0	99	0	423,000	8%	
002 – Unruh	7	15	37	0	375,000	25%	
004 – LOB	69	0	64	0	512,000	47%	
006 – Agriculture	0	0	13	2	46,000	8%	
010 – Rehabilitation	0	0	12	6	85,000	8%	
013 – EDD Solar	43	7	23	0	1,257,000	53%	
016 – Bonderson	38	9	16	12	800,000	42%	
019 – Veteran's Affairs	1	7	16	0	129,000	11%	
025 – EDD HQ	5	2	73	0	498,000	10%	
036 – Secretary of State	116	27	110	12	1,248,000	56%	
038 – Library & Courts Annex	37	14	47	8	322,000	58%	
049 – East End Education	0	0	112	0	690,000	17%	
051 – East End	0	0	112	19	720,000	16%	
052 – East End	0	0	112	0	363,000	17%	
053 – East End	0	0	112	0	365,000	16%	
054 – East End	0	0	112	0	364,000	16%	
084 – FTB San Diego	70	21	78	13	1,290,000	57%	
084 – FTB Los Angeles	118	29	35	11	1,004,000	24%	
091 – Blue Anchor	2	0	8	2	68,000	28%	
153 – CalTrans Distict 3	0	0	105	0	191,000	15%	
402 – San Francisco Civic Ctr.	265	47	325	12	174,000		
460 – Redding	0	1	2	0	64,000	19%	
461 – Red Bluff	6	3	6	0	167,000	61%	
470 – San Jose	32	9	25	0	395,000	58%	
480 – Santa Rosa	0	0	41	0	80,000	19%	
512 – Serra	0	0	55	4	614,000	16%	
602 – Harris	0	0	80	10	939,000	15%	
801 – San Diego State Bldg.	61	16	45	0	371,000	85%	
TOTALS	**910**	**207**	**1881**	**113**	**14,878,000**		

Boilers and cooling towers were replaced on several DGS facilities through ESCO and other energy efficiency projects. These building systems were near the end of their useful lives in

some cases. The new systems were much more energy efficient, and reduced water use in some cases as well. The following tables summarize projects replacing or upgrading landscape irrigation systems, as well as living landscapes at DGS facilities.

Table 4.6: Summary of Landscaping Hardware Water Efficiency Projects Completed or in Progress

Year Funded	Water Saved (Gallons/yr)	Estimated Annual Cost Savings	Total Number of Projects per Year
2015	3,510,000	20%	42 State buildings
2016			

Table 4.7: Summary of Living Landscaping Water Efficiency Projects Completed or in Progress

Year Funded	Water Saved (Gallons/yr)	Landscape Area MWELO (ft^2)	Climate Appropriate Landscape Area (ft^2)
2016	580,000	23,062	11,834

1. Capitol Park permeable paver project: 50 percent lawn reduction at north, south and west entrances.
2. Capitol Park east entrance: lawn replaced with low water-use plants and irrigation rotors replaced with drip irrigation.
3. Central Plant recycled blowdown water: Blowdown water from the Central Plant will be reused as recycled irrigation water at Capitol Park in the future.
4. New landscape improvements for DGS buildings are in design phases. Projects in construction for 2018 include Department of Rehabilitation, Capitol Park Yew Trees, Department of Personnel, Employment Development Department (EDD) Solar, and East End Complex.
5. Projects in design in 2018 include Fresno State Building, San Jose State Building, Santa Rosa State Building and EDD.

All of the water efficiency projects include revising existing landscape to meet the Model Water Efficiency Landscape Ordinance 2015 and Executive Order B-29-15. The estimated water savings is 50 percent or better for each of the projects. DGS staff is continually trained and able to implement projects once approved. When DGS works with contractors, the contracted staff are trained and do not require additional training to implement the projects.

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. 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) that details how a community would react to a reduction in water supply of up to 50 percent for 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 sub basins (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.

Three DGS buildings are located in critical groundwater basins. Two buildings are located in Fresno, and one in Stockton. All three buildings have obtained their city's Water Shortage Contingency Plans, are aware of the potential impact each stage may have on the facilities' water use, and have created their own contingency plans. In addition, all three buildings practice the recommended best management practices for water efficiency, and share this information with their tenants. The Stockton building reduced its water use during this period of time, however, the two Fresno buildings' water use increased. Reportedly, these two buildings have large homeless camps across from them and one of the buildings is open to the public, who come in and use the restrooms. Fresno's homeless population grew 20 percent between 2016-17. DGS' Facilities Management Division (FMD) is evaluating how to remedy this situation. The following table quantifies buildings in critical groundwater basins.

Table 4.8: Number of Buildings with Urban Water Shortage Contingency Plans and in Critical Groundwater Basins

Buildings with urban water shortage contingency plans.	Buildings in critical groundwater basins	Total Amount of water used by buildings in critical groundwater basins (Gallons) in 2016 (approximately)	Total Amount of water used by buildings in critical groundwater basins (Gallons) in 2017 (approximately)
1	3	4,593,063 gallons	5,460,186 gallons

Building Inventories Summary

FMD building managers will complete the building inventory walkthrough checklist associated with Executive Order B-18-12 at least every two years.

All irrigation equipment is currently installed. The table below is a description of completed work as of September 2015.

Heating and Cooling Systems Inventories Summary

DGS has several large facilities that utilize boilers, chillers and cooling towers, including the Sacramento Central Plant and several other facilities. A project is underway to reuse blowdown water from cooling towers at the Central Plant, by piping it to Capitol Park for irrigation use. This project is under design, and should go out to bid in late 2018.

Irrigation Hardware Inventories Summary

FMD surveyed and analyzed existing DGS irrigation controllers and hardware during the recent drought, and installed numerous flow meters, sub-meters, smart controllers, and on-site weather devices to reduce water use for irrigation at DGS facilities, and to reduce labor of landscape maintenance crews. They are summarized in the table that follows.

Table 4.9: Summary of Irrigation Hardware Inventory & Projects

Irrigation Hardware Measures Enacted	Added at New Facilities (2015)	Existing Facilities
Flow meters installed	11	11
Smart controllers installed	60	11
Manual read meters installed	23	8
Central controllers installed	4	9
On-site weather devices installed	30	12

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. Further, landscaping in public places frequently surrounds historic places and memorial monuments, and provides pleasant public gathering spaces. The health and proper maintenance of these landscapes is vital to the physical well-being of California's people as well as to its social, cultural, political and historical life.

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 conservation, and water and energy efficiency. Urban forests are vital to improve site conditions for occupants and visitors to buildings and the surrounding community. The following table lists DGS living landscapes and planned efforts to convert some landscape areas to water-conserving landscapes.

Table 4.10: Summary of Living Landscape Inventory

Landscape >500Sq. ft.)	Landscapes to meet MWELO (sf)	Historical Sites or Memorials	Convert to Water Conserving landscape or erosion control (sf)
Capitol Park Paver Project	21,727	1	10,864
Capitol Park East Lawn	1,335	1	1,335
Capitol Park M Street	7,000	1	7,000
Van Nuys State Bldg.	14,000		14,000
Mission Valley State Bldg.	80,000		80,000
Red Bluff State Bldg.	56,000		56,000
Redding State Bldg.	24,000		24,000
Dept. of Personnel	15,000		15,000
Dept. of Rehabilitation	16,000		15,000
Afred Alquist San Jose Bldg.	11,000		11,000
EDD Solar	28,000		28,000
EDD (025)	42,000		42,000
Department of Justice	349,100		349,100
Franchise Tax Board	51,000		51,000
Joseph Rattigan Santa Rosa Bldg.	8,000		8,000
Fresno State Bldg.	34,000		34,000
DWR Fresno	12,000		12,000
Court of Appeals Riverside	14,000		14,000
Caltrans Marysville	12,000		12,000
Civic Center S.F.	7,800		7,800
CPUC	2,000		2,000
Stockton State	11,200		11,200

The Capitol Park Paver project resulted in a 50 percent water reduction at the north, south and west lawns. The permeable pavers allow runoff and rainwater to recharge the ground water. Pavers were selected versus plant material due to Capitol Park's high volume of public events. DGS designed the project in 2015 and installed it to completion in 2017.

The Capitol Park east lawn entrance required the removal of 1,335 sf of lawn and replacement with low water-use plant material. The irrigation was also revised from spray rotors to drip irrigation. The project will save the state a minimum of 50 percent of Capitol Park's previous water use.

Five DGS state projects have been completed since 2015 and five other landscape projects on DGS state property are proposed to be installed in spring 2019. Remaining projects listed above are in the design stage or are proposed to be installed in fall 2019 or spring 2020. DGS proposed to convert DGS state landscapes per the latest Model Water Efficient Landscape Ordinance.

Large 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. The following table lists facilities, areas, and recommended Model Water Efficient Landscape Ordinance (MWELO) budgets.

Table 4.11. Summary of Large Landscape Inventory and Water Budget

Name of Facility Sites/Locations with > 20,000 sq. ft. of Landscaping	Total Landscape Area per Facility	Exist. Estim. Yearly Water Budget per Facility (prior drought)	MWELO Recomm'd Yearly Water Budget per Facility	Total EPA WaterSense or Irrigation Association Certified Staff
Capitol Paver Project	21,727	1,160,000	580,000 (exempt)	2
Mission Valley (erosion control measures only)	80,000	986,000	1,200,000	
Redding State Bldg.	24,000	700,000	340,000	
Red Bluff State Bldg.	56,000	1,660,000	800,000	
EDD (025)	42,000	1,250,000	590,000	
EDD Solar	28,000	840,000	400,000	
Dept. of Justice	350,000	10,000,000	5,000,000	
Franchise Tax Board	51,000	1,500,000	730,000	
Fresno State Bldg.	34,000	1.000,000	480,000	

Best Management Practices for Facility Water

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.

FMD's building managers and groundskeepers reported that they follow the BMPs. To reinforce awareness of BMPs, FMD recently created a SharePoint site accessible by all building managers with sustainability policy information, including BMP. Building managers will distribute BMP'sfor water efficiency with their staff and with tenants at least annually. Also, custodians are expected to perform at least monthly the BMP of visual leak detections of all water use fixtures, and this practice will be indicated in FMD's forthcoming custodian training manual. Finally, FMD's landscape architects incorporate sustainable landscape practices in their landscape projects.

CHAPTER 5 - GREEN OPERATIONS

Greenhouse Gas Emissions

State agencies are directed to take actions to reduce entity-wide greenhouse gas emissions (GHGs) by at least 10 percent by 2015 and 20 percent by 2020, as measured against a 2010 baseline.

DGS has reduced entity-wide GHG emissions by 57 percent since 2010 through various measures outlined below.

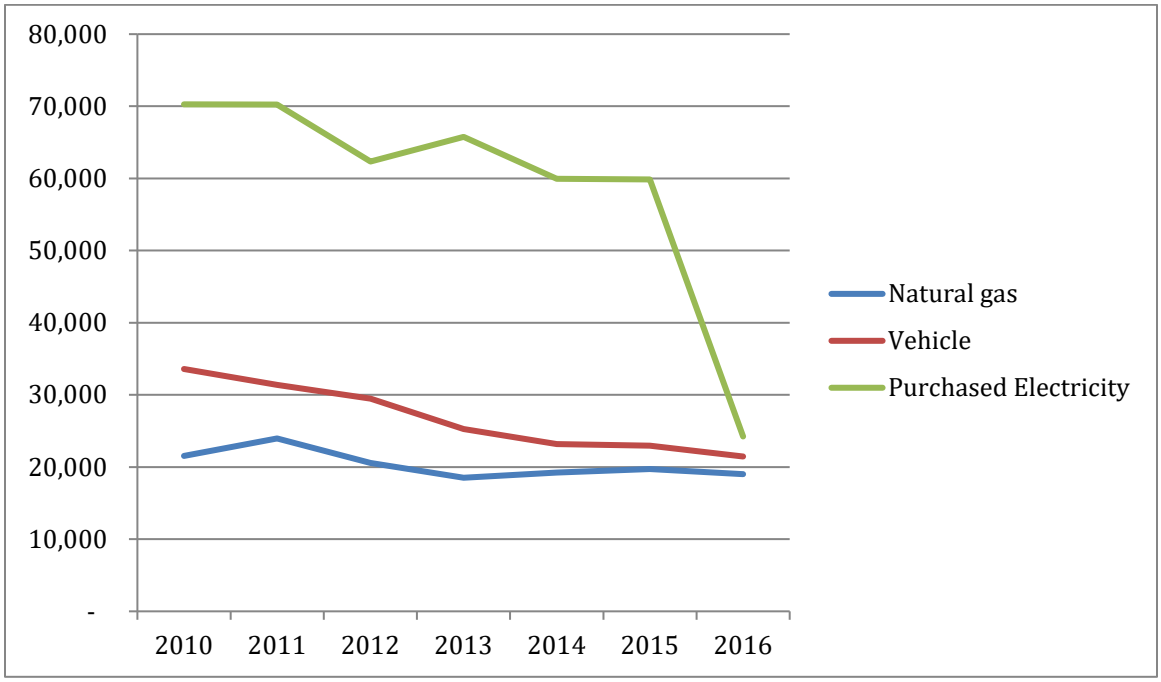
- **Energy Efficiency** – DGS has reduced total grid-based energy use at DGS facilities by over 17 percent since 2010, even with its total building area increasing by 12 percent during that same time frame. This contributed to GHG emission reductions during that period.
- **On-Site Renewable Energy** – DGS installed 3 MW of on-site renewable energy in 2017 at the Franchise Tax Board facility through a PPA, and is installing 3.5 MW in 2018 and 1 MW in 2019 at other DGS facilities. On-site renewable energy generation contributes to reduced GHG emissions from state operations.
- **Purchased Renewable Energy** – In 2017, DGS purchased 143 gigawatt hours (GWh) of renewable energy through several utility programs with the Sacramento Municipal Utility District (SMUD). This constitutes 73 percent of total DGS electricity use from renewable energy sources and greatly reduced DGS' GHG emissions from building operations.
- **Fuel-Efficient Vehicles** – DGS leads by example as it integrates fuel efficient ZEVs into California government. Adding fuel-efficient vehicles to the fleet through ZEV purchasing surpassed 2015 requirements of 10 percent and will increase to 25 percent by 2020. In addition, DGS is providing charging stations in its owned facilities for workplace and fleet vehicle use. To further encourage GHG reductions, DGS provides preferential parking policies for ZEVs in state-owned garages.
- **Biofuels** – Renewable Diesel R-99 contract provides contracted pricing to the state of California and has a lower carbon intensity than conventional diesel. Because this commodity is made from renewable resources, it is considered an environmentally preferable purchase and contributes to reducing GHG. Biofuel emissions are classified as "biogenic emissions" which do not count against state emissions. In fact, in 2017, renewable diesel removed 45 thousand tons of GHG emissions that were placed into this separate category. DGS does not purchase diesel fuel for its fleet and therefore has nothing to report regarding renewable diesel. State contracts may be open to local governmental agencies as defined by Public Contract Code Section 10298.

Table 5.1 and Graph 5.1 below show GHG emissions from DGS operations since 2010.

Table 5.1: GHG Emissions since 2010

	2010	2011	2012	2013	2014	2015	2016	Percent Change since Baseline
Natural gas	21,556	23,962	20,587	18,516	19,233	19,741	18,996	-11.88%
Vehicles	33,588	31,380	29,461	25,251	23,165	22,954	21,460	-36.10%
Purchased electricity	70,272	70,225	62,340	65,778	59,956	59,870	24,234	-65.51%
Total	125,416	125,567	112,388	109,545	102,355	102,565	64,690	-48.42%

Graph 5.1: GHG Emissions since 2010



Building Design and Construction

Executive Order 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 are also required to be commissioned after construction. Table 5.2 below shows both DGS new or major renovation projects that have occurred at DGS facilities since 2012.

Table 5.2: New Construction since July 1, 2012

Project Name	LEED Level Achieved	Cx Performed (Y/N)
Caltrans District 3 Headquarters, Marysville	LEED-NC Silver	Y
Governor's Mansion Renovation	LEED-NC Gold	Y

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 (IEQ) 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.

To ensure that new construction incorporates the IEQ provisions of CALGreen Tier 1, DGS has worked with the U.S. Green Building Council (USGBC) to see that new projects built to California's robust energy and green building codes (CALGreen) are preapproved for significant

streamlining of fundamental LEED requirements including incorporating the IEQ provision of CALGreen Tier 1. This recognition in LEED makes it possible for projects built to the state's building codes to achieve all prerequisites in LEED and up to six points. All projects subject to EO B-18-12 now have a simplified path to achieving both LEED and CALGreen compliance.

LEED for Existing Buildings Operations and Maintenance

All state buildings over 50,000 square feet were required to complete LEED for Existing Buildings: Operations & Maintenance (LEED-EBOM) certification by December 31, 2015 and meet an Energy Star rating of 75 to the maximum extent that is cost-effective.

- DGS hired a consultant to develop a volume certification prototype and to certify the DGS portfolio through the LEED Volume Certification program. This process has been underway for a few years, with much success. The Volume Certification program allows DGS to submit multiple certifications in batches using our prototype system, limiting duplicate documentation, and at a reduced volume certification price. Because of the accuracy of our submittals, USGBC doesn't need to review every submission so they audit a percentage of DGS projects, saving review time. LEED-EBOM certifications expire after five years, so they need to be recertified after that time. Originally, DGS certified 26 buildings between 2009-2011 with a different consultant. Through the current Volume Certification Program, those previous buildings are being recertified (nine are completed and more underway), as are additional buildings from the DGS portfolio (seven first-time certifications with more underway).
- The major barriers for LEED certification for some of the DGS portfolio include meeting the minimum energy efficiency requirement of an Energy Star score of 75. Several DGS buildings are well below that threshold, and some are closer to meeting it, requiring improvement in energy efficiency to become certified. Other barriers include lack of sub-metering on some campuses, and inconsistent district energy data at the Sacramento Central Plant.
- DGS is working to develop ESCO-funded projects that will improve energy efficiency to exceed an Energy Star score of 75 in buildings pursuing LEED-EBOM certification. Some of these buildings are working to achieve even deeper efficiency to meet ZNE Source EUI targets for existing buildings.

Table 5.3 below quantifies how many of DGS' large buildings have achieved LEED-EBOM.

Table 5.3: LEED for Existing Buildings and Operations

Buildings > 50,000 sq. ft. eligible for LEED-EBOM	Buildings > 50,000 sq. ft. Certified LEED-EBOM	% of LEED-EBOM eligible buildings > 50,000 sq. ft. certified to LEED-EBOM
45	32	71%

Indoor Environmental Quality

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

IEQ must also be maintained through the use of low-emitting furnishings, cleaning products and cleaning procedures.

New Construction and Renovation

DGS incorporates voluntary measures from CALGreen related to IEQ in all building projects through its adherence to the governor's order that all project incorporate LEED into the scope of the work.

- Adhesives, sealants, caulks, paints, coatings and aerosol paints and coatings that meet the volatile organic chemical (VOC) content limits specified in CALGreen align with requirements adopted in the USGBC LEED program.
- DGS utilizes project specifications that include LEED environmental quality (EQ) prerequisite minimum indoor air quality prformance criteria that aligns with the CALGreen Part 11 requirements related to IEQ. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff. Contractors found not following these specifications are subject to a hold on payment for the materials and installation until corrections can be made. Likewise, carpet systems, carpet cushions, composite wood products, resilient (e.g., vinyl) flooring systems, and thermal insulation, acoustical ceilings and wall panels that meet the VOC emission limits specified in CALGreen align with requirements adopted in the USGBC LEED program.

For all new construction and renovation projects, DGS includes the following measures into our building process:

- DGS includes commissioning to ensure proper operation of all building systems, including delivering the required amount of outside air.
- DGS utilizes project specifications that include commissioning for HVAC system performance including the required amount of outside air. These specification requirements are reviewed with the contractor during the project. When required, DGS engages commissioning agents to work with DGS inspections staff to ensure that outside air exchanges of installed equipment meet the project specifications.
- DGS utilizes project specifications that include LEED EQ prerequisite minimum indoor air quality performance criteria that aligns with the CALGreen Chapter 5.5 requirements related to IEQ. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff. Contractors found not following these specifications are subject to a hold on payment for the materials and installation until corrections can be made.
- DGS utilizes project specifications that include LEED Performance criteria that aligns with the CALGreen air filtering and ozone removing devices. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff. Contractors found not following these specifications are subject to a hold on payment for the materials and installation until corrections can be made.

- DGS utilizes project plans and specifications that include airflow monitoring systems that are integral to the overall building management systems required on all projects seeking to meet and exceed CALGreen, Title 24 and LEED requirements. These specification requirements are reviewed against material and equipment submittals from the contractor during construction and verified as used by the DGS inspections staff. Contractors found not following these specifications are subject to a hold on payment for the materials and installation until corrections can be made.
- DGS utilizes project specifications that include LEED EQ prerequisite minimum indoor air quality performance criteria that aligns with the CALGreen Chapter A5.501.1 through A5.504.2 requirements related to indoor environmental quality. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff. Contractors found not following these specifications are subject to a hold on payment for the materials and installation until corrections can be made.

DGS maximizes daylighting (providing natural daylight to work spaces) in new construction by:

- Where possible, providing a direct line of sight to the outdoors via vision glazing between 2.5 and 7.5 feet above the finished floor in 90 percent of all regularly occupied areas.
- Requiring that all designs for new building projects follow design principals that incorporate features that reduce electricity and meet ZNE, LEED, and CALGreen requirements for daylighting and vision glazing such as those mentioned above. DGS submits these designs to the USGBC for certification that the designs meet the LEED requirements prior to putting these designs out to bid.
- Using top lighting and side lighting, light shelves, reflective room surfaces, as a means to eliminate glare.
- Incorporating photo sensor controls to provide artificial lighting only to areas of need in lieu of uniformly applying artificial lighting regardless of need.
- Requiring that all designs for new building projects follow design principals that incorporate these features that reduce electricity and meet ZNE, LEED, and CALGreen requirements for daylighting and vision glazing such as those mentioned above. DGS submits documentation to the USGBC for certification that the designs meet the LEED requirements prior to putting these designs out to bid.

Furnishings

DGS ensures that all furniture and seating purchased by the department complies with either:

- The DGS Purchasing Standard and Specifications (*Technical Environmental Bid Specification 1-09-71-52,* Section 4.7) or
- The American Society of Heating, Refrigerating and Air-Conditioning Engineers' (ASHRAE) Standard 189.1-2011 (Section 8.4.2.5).

  To achieve this, DGS utilizes project specifications that include meeting these requirements. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff.

DGS utilizes the California Prison Industry Authority (CALPIA) for all the furniture purchases. CALPIA provides aid in acquiring for outside agencies as well as for DGS' own purchases.

- Where CALPIA is unable to meet the furniture needs, DGS utilizes project specifications that include DGS' Purchasing Standard and Specifications (Technical Environmental Bid Specification 1-09-71-52) requirements. These specification requirements are reviewed against material submittals from the contractor during construction and verified as used by the DGS inspections staff.

Cleaning Products

The DGS Facilities Management Division (FMD) recently produced the Green Purchasing Memo in collaboration with LEED Existing Buildings (EB) certification consultant CodeGreen and DGS' Office of Business and Acquisition Services, provided training on its use at the annual statewide building managers' meeting and distributed it electronically to requisitioners who purchase custodial supplies. The memo provides comprehensive guidance and a certified product database to make it easy for those purchasing cleaning and other custodial supplies to select Green Seal or Ecologo certified products. Additionally, FMD's LEED consultant, CodeGreen, has trained all LEED EB certification candidate building management units to use web-based sustainability tracking and LEED EB recertification software ProAct to track green cleaning product purchases as well as other sustainability performance items. This will enable management to monitor green custodial supply purchasing patterns at tracked locations.

In addition, FMD is in the process of incorporating a preferred cleaning product list into its standardized training program for custodians. All DGS-owned buildings will implement the training program in 2018.

Cleaning Procedures

DGS FMD is participating in the USGBC's Volume Certification program for existing buildings. The DGS Green Cleaning Policy and Green Cleaning Program for cleaning supplies, equipment and procedures were established as part of the DGS Volume Certification prototype, and are adopted by each on-site team as the building undergoes the certification process. Cleaning purchasing and procedures meet or exceed the cited standards. Per policy, existing cleaning equipment that does not meet the cited standard will be replaced with compliant equipment at

the end of its service life. Buildings pursuing LEED EB credit IEQc3.5 exceed the cited requirement for entryway maintenance.

HVAC Operation

DGS FMD buildings participating in the LEED EB Volume Certification program meet LEED EB IEQp1, which requires compliance with ASHRAE Standard 62.1-2007, or alternatively, a minimum of 10 cubic feet/minute per person under normal operating conditions if the existing system cannot be modified to meet the former standard.

FMD leverages the Enterprise Asset Management System, Maximo, to maintain its preventive maintenance program including all HVAC-related hardware and systems. This includes documenting completion of process steps, requests for work on equipment not operating correctly, failure histories, and corrective action taken by FMD field staff and contractors.

Specific preventive maintenance (PM) work orders are automatically generated based on industry-standard specifications for PM activities. Each PM work order includes the process and procedure steps required to maintain equipment and systems to industry standards.

Both periodic and randomly generated validation inspection tasks generated by Maximo and assigned to management team members serves as confirmation of appropriate completion of maintenance processes and procedures. In the event of errors by field staff, corrective work orders are issued to resolve discrepancies.

Standard PM actions over the course of weekly, monthly, quarterly and annual PM work orders include filter replacement, coil inspection and cleaning, biocide pad replacement, water treatment testing and documentation, inspection and operational testing of all dampers, actuators, linkages, and economizer hardware. Periodic PM tasking for building automation systems, where those exist, include the confirmation of minimum set points for fresh air intake systems and hands-on/visual confirmation of operation for system hardware.

FMD has an ongoing program to incorporate LEED EB for all DGS-owned facilities.

Integrated Pest Management

Department staff and contracted pest management companies will follow an integrated pest management (IPM) strategy that focuses on long-term prevention of pest problems through monitoring for pest presence, improving sanitation, and using physical barriers and other nonchemical practices. If nonchemical practices are ineffective, Tier 3 pesticides may be used, progressing to Tier 2 and then Tier 1 if necessary. Table 5.4 lists current IPM contracts.

Table 5.4: Pest control contracts

Pest Control Contractor	IPM Specified (Y/N)
Hunters Services	Y
American Pest Control	Y
Cats USA	Y
Big Time Pest Control	Y
Ecotech Pest Management	Y
Advanced IPM	N
EagleShield Pest Control	N

IPM is already integrated into most of the pest management contracts for DGS-owned facilities. Two contractors specify herbicides/insecticides listed on the Oakland Department of Environment Hazard Screening List rather than the current San Francisco Department of Environment Hazard Screening List that is referred to in MM 15-06. DGS' FMD will seek to amend these contracts to specify the San Francisco list. If this is not possible, FMD will re-bid these contracts when they expire in 2020.

Environmentally Preferable Purchasing

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

Reducing Impacts

The environmental impact of the goods we buy is often larger than the impact of our own department operations. Our department is committed to reducing the environmental impact of the goods and services we purchase.

The DGS Office of Business and Acquisition Services (OBAS) is committed to buying goods and services that lessen impacts to public health, natural resources, economy and the environment.

- OBAS will reduce environmental impacts such as energy, water and natural resource conservation when making purchasing decisions by adhering to all the DGS purchasing standards identified in the DGS Procurement Division's Buying Green website. OBAS' management team will consistently communicate the available contracts and resources available to the team, which will result in an increase in green purchasing.
- Further opportunities can be identified where contractors provide EPP goods and meet State Agency Buy Recycled Campaign (SABRC) requirements in service contracts. OBAS plans to add language in its service contracts to capture EPP goods and meet SABRC requirements.
- Further discussions are underway to incorporate "green" language so DGS can meet SABRC requirements. DGS currently has a comprehensive method of capturing SABRC information in its public works contracts. DGS will look at how it can have a similar format in DGS service contracts.
- OBAS will ensure the goods and services we buy meet the current DGS purchasing standards and specifications available from the DGS Buying Green website, providing consistent communication and awareness to DGS customers of the resources available as well as the value and benefit to the environment, the community and to the department. Communicating the authority to procure green products, such as in Executive Order B-18-12 and Management Memo 14-07, will also assist in the support of procuring green and will ensure OBAS procurements meet the DGS purchasing standards.

OBAS has identified the actions already taken to ensure purchases are EPP for each product category below:

- **Paint** (i.e., Master Painters Institute certified paint and recycled paint).

  OBAS will use frequent communication to the acquisition analyst identifying that the current contract is available, and will inform the team where to find further information and resources when future solicitation opportunities arise.

- **IT goods** (Energy Star rated computers, monitors and televisions meet DGS-52161505 Purchasing Standard or meet current specifications of statewide contracts).

  OBAS communicates the available resources to its acquisition analyst in order to ensure EPP compliance. OBAS currently procures from the Procurement Division's PC Goods, Desktop, Laptops, Monitors & Tablets statewide contracts that comply with DGS purchasing standards.

- **Janitorial supplies and cleaners** (EcoLogo, Greenseal certified cleaners, DGS_471318A Purchasing Standard compliant). OBAS provides frequent and consistent communication such as in the January 9, 2018 OBAS Customer Collaboration Forum (CCF) identifying and promoting janitorial supplies and cleaners to give direction to state purchasers. Also communicated at the CCF was the DGS Facilities Management Division (FMD) Memo of August 18, 2017, "Green" Custodial and Lighting Supply Product Selection, identifying available contracts for specific janitorial products. http://www.documents.dgs.ca.gov/pd/EPP/Gov-ops/CLEANING%20PRODUCTS%20&%20HANDSOAPS%20-%20FI$CAL%20CHEAT%20SHEET-webpage.pdf, http://www.documents.dgs.ca.gov/pd/EPP/Gov-ops/TRASH%20BAGS%20&%20LINERS%20-%20FI$CAL%20CHEAT%20SHEET.pdf
- **Janitorial supplies, paper products** (i.e., SABRC-compliant and DGS_141117A purchasing standard compliant). The same communication is provided as with the janitorial cleaners: frequent and consistent communication such as in the January 9, 2018 OBAS CCF identify and promote janitorial supplies and paper products. The DGS FMD Memo of August 18, 2017, was also communicated at the CCF and included "Green" Custodial and Lighting Supply Product Selection. DGS is identifying available contracts for specific janitorial products. http://www.documents.dgs.ca.gov/pd/EPP/Gov-ops/PAPER%20PRODUCTS%20-%20FI$CAL%20CHEAT%20SHEET.pdf
- **Desk Lamps** (DGS-391115-A Purchasing Standard compliant). The same steps were taken as with janitorial cleaners: frequent and consistent communication at OBAS CCF as well as the communication and distribution of the FMD "Green" Memo. Identifying available contracts for specific desk lamp products. http://www.documents.dgs.ca.gov/pd/EPP/Gov-ops/LAMPS%20-%20FI$CAL%20CHEAT%20SHEET.pdf

- **Office equipment** (i.e., EPEAT compliant and Energy Star rated printers, copiers and DGS_432121A Purchasing Standard compliant for high-end multifunctional devices) OBAS communicates the available resources to DGS' acquisition analyst in order to ensure EPP compliance. DGS currently procures from PD's printers statewide contracts.
- **Paper products** (i.e., Sustainable Forestry Initiative certified, SABRC-compliant copy paper, DGS-441200-A Purchasing Standard compliant). The same steps were taken as with janitorial cleaners: OBAS makes frequent and consistent communication at OBAS CCF as well as through the communication and distribution of the FMD "Green" Memo that identifies available contracts for specific paper products.
- **Remanufactured toner cartridges** (available from PIA and statewide contract ID/Number: 1-15-75-61). OBAS communicates the available resources to the DGS acquisition analyst in order to ensure EPP compliance. DGS currently procures from PD's Ink & Toner Cartridges statewide contracts #1-14-75-60A & #1-15-75-61.

Measure and Report Progress

Following are OBAS' ongoing and future strategies and plans to increase EPP:

OBAS is participating in the Sustainable Purchasing Leadership Council's (SPLC) California (CA) Agency cohort, which is sponsored by the DGS Procurement Division. The objective is to communicate the benefits and value of sustainable purchasing as well as to identify a measureable baseline of the organization's sustainable purchasing. The SPLC CA Agency Benchmark will also identify the department's current sustainable purchasing maturity level. The department's maturity level is determined by current policy and processes that relate to sustainable purchasing. The SPLC CA Agency Benchmark measures the department in several categories by identifying if its initiating, developing, improving or leading.

Identifying where we are as an organization will assist in setting reasonable and obtainable sustainable purchasing goals, which will increase EPP percentage as well as align to meet statewide initiatives such as Management Memo 14-07 and 17-04.

The following are strategies that OBAS has begun or will implement this year:

- Increase EPP spending include identifying top 5 percent of spend with largest opportunity to "green."
    - Currently identifying top commodities with most green opportunities.
- Incorporate EPP criteria in the goods and services the state buys.
    - Will incorporate EPP language in service contracts.
- Embed sustainability roles and responsibilities into purchasing procedures.
    - Revising current desk manuals to incorporate sustainability roles and responsibilities in process.
- Train buyers in the benefits of buying EPP products, how to apply EPP best practices, the importance of accuracy in recording buys within the State Contracting & Procurement

Registration System (SCPRS), reporting labor separate from goods in service contracts and listing EPP goods by line item.

- Enroll all acquisition analysts in the Procurement Division's EPP training and FI$Cal training as well as any other training that can assist in the support of sustainable purchasing.

OBAS' efforts to measure, monitor, report, and oversee progress to increase EPP include:

- The implementation of FI$Cal will identify a baseline of DGS EPP spend and begin setting attainable goals where EPP procurements are increased. OBAS will routinely run reports to measure progress and make adjustments to improve EPP spend if needed.
- With the implementation of FI$Cal, OBAS EPP transactions will be captured. Multiple reports can be extracted from FI$Cal to identify EPP procurements. Incorporating how to enter the data into FI$Cal in DGS desk manuals as well as consistent communication and awareness of the benefits and value of sustainable purchasing will ensure EPP procurements will be documented. Also, communicating operational goals to increase EPP procurement percentages will support consistent recording into Fi$Cal.

OBAS has historically and continuously complied with SABRC reporting. Past challenges, where multiple roles and responsibilities were assigned to the report coordinator, prevented OBAS from significantly increasing SABRC compliance. As of last year (2017) this role has been reassigned so SABRC compliance could be more effectively communicated and bring awareness to the department as well as play a more active role in the day-to-day functions within OBAS. The two biggest challenges in this role are identifying the main point of contact within the multiple lines of business within DGS that provides the data needed to complete the SABRC report as well as those incidental buyers such as CAL-Card holders needing to capture and enter that data into FI$Cal. Unless the information is entered into FI$Cal, the data will not be captured.

Table 5.5 below identifies OBAS' State Agency Buy Recycled Campaign for fiscal year 2015-16:

Table 5.5: State Agency Buy Recycled Campaign 2016 Performance

Product Category	SABRC Reportable Dollars	SABRC Compliant Dollars	% SABRC Compliant
Antifreeze	$0.00	$0.00	0%
Compost and mulch	$1,605.75	$1,605.75	100%
Glass products	$61,986.76	$59,685.60	96.29%
Lubricating oils	$58,194.40	$7,472.00	12.84%
Paint	$746.10	$0.00	0%
Paper products	$1,853,759.76	$1,255,422.26	67.72%
Plastic products	$428,790.27	$270,218.87	63.02%

Printing and writing paper	$8,032,414.79	$2,863,300.73	35.65%
Metal products	$2,029,932.07	$1,382,526.17	68.11%
Tire-derived products	$0.00	$0.00	0%
Tires	$54,364.22	$0.00	0%

Table 5.6 below identifies the top five commodities that OBAS will have the greatest potential to green. Our commitment to increase spend each year for the top 5 commodities is 10 percent but for the top two (printing paper and lights) our goals will be an increase of 20 percent.

Table 5.6: Commodities categories with the greatest Potential to Green

Commodity	2017 Total Spend ($)	2017 Percent EPP Spend (%)	EPP Target (%)
Printing, copy & writing paper	$906,503.41	$393,104.21	43.36%
Lights	$83,952.34	$14,776.86	17%
Toilet paper	$624,411.30	$500,669.75	80.18%
Ink/ink cartridges	$54,612.38	$11,143.74	20%
Trash liners	$44,727.21	$14,960	33%

***Note:** 2017 information was provided as there was no process in place in 2016 to capture accurate EPP data. Since transacting in FI$Cal, EPP data is captured. 2017 was the first full year transacting in FI$Cal.

Sustainability Development and Education

Below are OBAS efforts to promote the understanding and advancement of sustainable procurement internally within DGS and external suppliers.

- OBAS will identify how it notifies bidders of EPP requirements within the following areas: construction contracts, service and transportation agreements, commodity purchases, grants, interagency agreements and Architecture and Engineering (A&E) contracts. As stated earlier, OBAS currently does not have EPP language in its service contracts. OBAS is currently developing provisions that it will be including in service contracts by the end of 2018, and will be integrated into OBAS service contracts moving forward. OBAS does have EPP requirements and a language matrix incorporated into OBAS construction contracts project manuals. This format will be utilized to develop the service contract format, Matrix. OBAS currently utilizes PD's statewide commodity contracts, which already have EPP requirements included.

  Moving forward in establishing a robust sustainable purchasing program, staff will attend outreach events to connect DGS procurement needs to suppliers. OBAS will meet with its external stakeholders such as DGS Procurement Division's Engineering Branch and CalRecycle contacts.

- OBAS does not have specific staff dedicated solely to EPP, but has assigned specific EPP tasks to multiple staff. As one of their various duties, a manager has been assigned to oversee the development of a sustainable purchasing program within OBAS. As the program grows, there may be a potential need to dedicate staff or a team to continue the sustainable purchasing program's efforts.

DGS PD conducted EPP training for purchasers statewide through 2012. PD is currently developing online training modules that will be available on demand by the end of 2018. It will include an assessment test and survey. Table 5.7 below identifies by CalHR classification that none of the DGS buyers within OBAS, or from procurement staff have received training recently, and that all will need to complete EPP training once the online training is available. This is a strategy to increase the purchase of EPP goods and services. OBAS is developing EPP provisions to include in its service contracts by the end of 2018.

Total Number of Employees Assigned as Buyers: 50

Table 5.7: Buyers who have completed EPP Training

CalHR Classification	Total Number of Buyers	Percent Completing EPP Training	Commitment to have buyers complete EPP training (%)
Office Technician	0	0	0
Staff Services Analyst	12	0	100%
Associate Governmental Program Analyst	34	0	100%
SSA/AGPA (V)	4	0	

OBAS believes that every training is an investment in its staff. OBAS encourages training and has adopted a matrix it follows to document the trainings available and the participation in the development of its staff. Below is a link to the training matrix that identifies the additional training and certifications in which OBAS analysts participate beyond the basic CalPCA EPP training course.

http://dgssp.dgs.ca.gov/sites/OBAS/TeamOnly/Service%20Contract%20Section/Service%20Contracts/SC%20DM%20Reference%20Documents/OBAS%20Training%20Schedule.docx

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, 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.

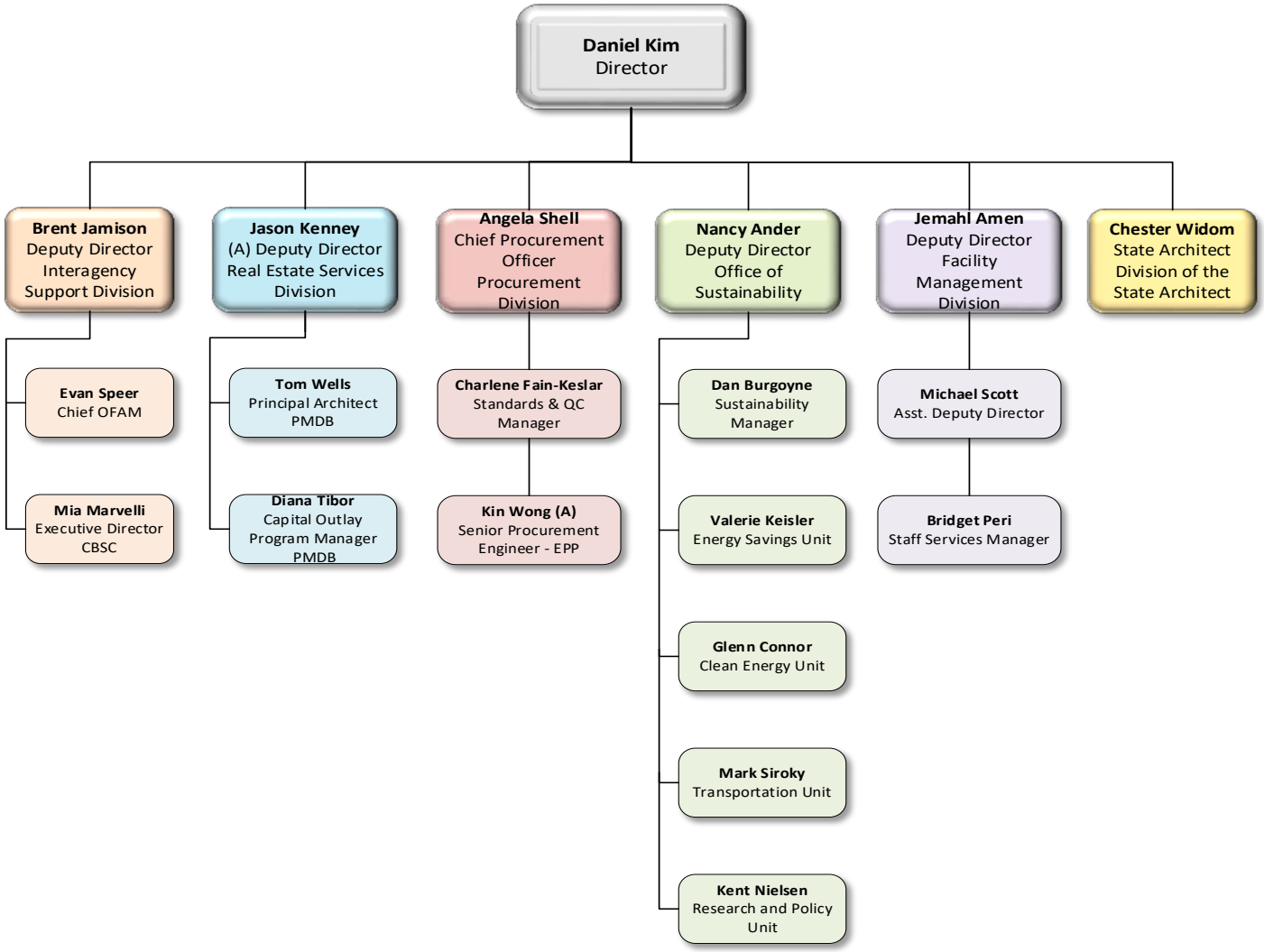
DGS's goal is that the average location efficiency score for all new leases be 10 percent higher than our average as of January 1, 2017.

Appendix A – Sustainability Leadership

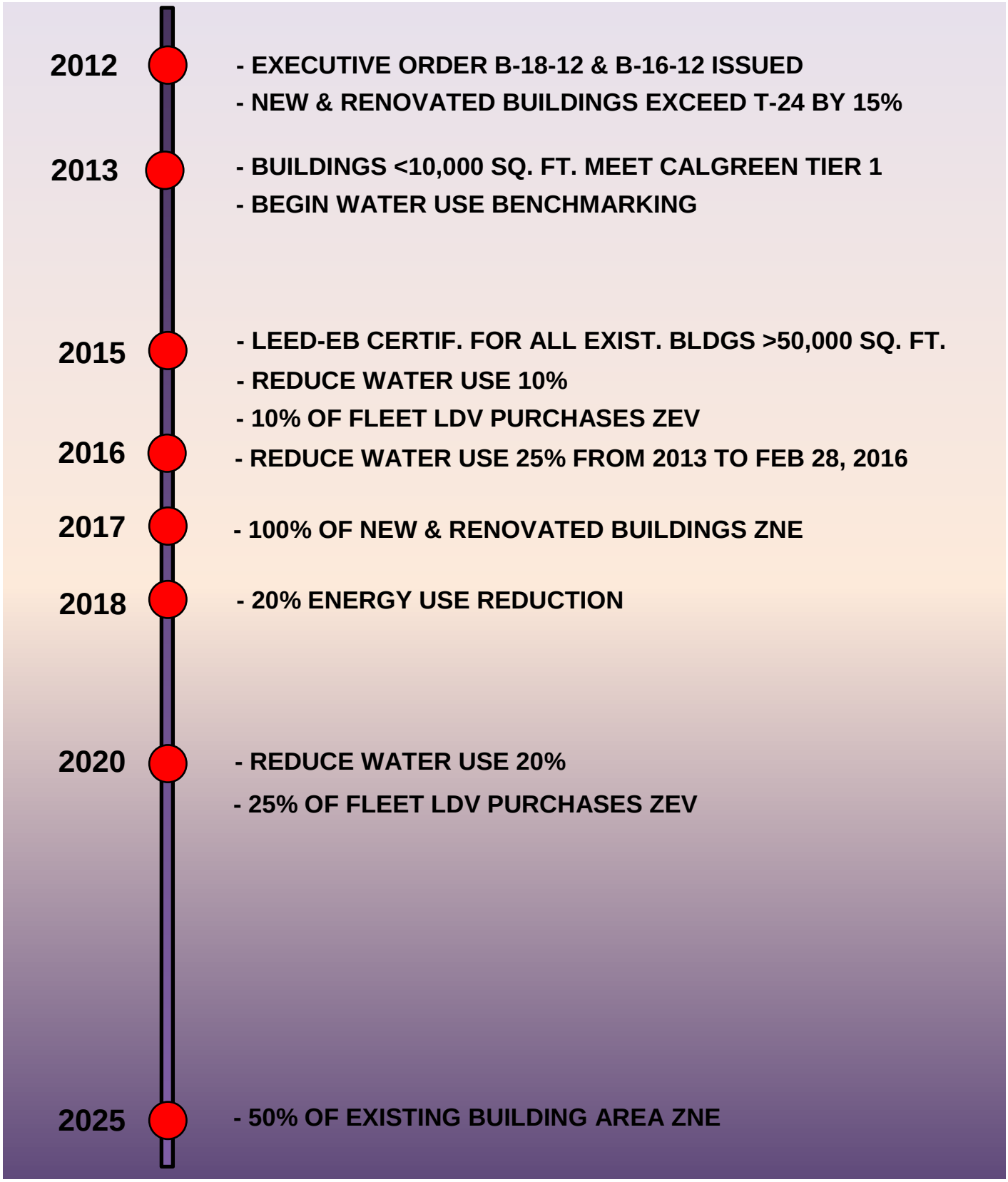
Department of General Services

Sustainability Leadership

June 2018



Appendix B – Sustainability Milestones/ Timeline



Appendix C - 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 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 – 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.

Grass cycling -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% or more), contains little lignin and has high nitrogen content, grass clippings easily break down during an aerobic process. Grass cycling 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. Grass cycling can provide 15 to 20% 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 – 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% for droughts lasting up to three years.

Appendix D – Department Stakeholders

Climate Change Adaptation

Understanding Climate Risk at Existing Facilities	
OS	Nancy Ander, Deputy Director, Sustainability Dan Burgoyne, Project Director Kent Nielsen, Staff Services Manager 2

Understanding Climate Risk at Planned Facilities	
PMDB	Jason Kenney, Deputy Director (Acting), Real Estate Services Division Tom Wells, Principal Architect

Integrating Climate Change into Department Planning and Funding Programs	
PMDB	Jason Kenney, Deputy Director (Acting), Real Estate Services Division Tom Wells, Principal Architect

Measuring and Tracking Progress	
PMDB	Jason Kenney, Deputy Director (Acting), Real Estate Services Division Tom Wells, Principal Architect
OS	Nancy Ander, Deputy Director, Sustainability Dan Burgoyne, Project Director

Zero Emission Vehicles

Incorporating ZEVs Into the Department Fleet	
OFAM	Evan Speer, Chief Brent Jamison, Deputy Director

Telematics	
OFAM	Evan Speer, Chief Brent Jamison, Deputy Director

Public Safety Exemption	
N/A	N/A

Outside Funding Sources for ZEV Infrastructure	
OS	Mark Siroky, Transportation Manager Nancy Ander, Deputy Director

Hydrogen Fueling Infrastructure	
OFAM	Evan Speer, Chief Brent Jamison, Deputy Director

Comprehensive Facility Site and Infrastructure Assessments	
OS	Mark Siroky, Transportation Manager Nancy Ander, Deputy Director

EVSE Construction Plan	
OS	Mark Siroky, Transportation Manager Nancy Ander, Deputy Director

EVSE Operation	
OFAM	Evan Speer, Chief Brent Jamison, Deputy Director

Energy

Zero Net Energy (ZNE)	
OS	Nancy Ander, Deputy Director, Sustainability Dan Burgoyne – Zero Net Energy Program Manager, policy development and ZNE strategy support for DGS and state agencies
PMDB	Jason Kenney, Deputy Director (Acting), Real Estate Services Division Tom Wells, Principal Architect in charge of Sustainability Design Implementation, ZNE design of new projects Shelly Whitaker, Capital Outlay Program Manager in charge of Sustainability Project Management Implementation
FMD	Jemahl Amen, Deputy Director, responsible for ZNE of half of existing building portfolio area

New Construction Exceeds Title 24 by 15%	
PMDB	Jason Kenney, Deputy Director (Acting), Real Estate Services Division Tom Wells, Principal Architect in charge of Sustainability Design Implementation Shelly Whitaker, Capital Outlay Program Manager in charge of Sustainability Project Management Implementation

Reduce Grid-Based Energy Purchased by 20% by 2018	
FMD	Jemahl Amen, Deputy Director

Server Room Energy Use	
ETS	Gary Renslo – Chief Information Officer

Demand Response	
FMD	Jemahl Amen, Deputy Director

Renewable Energy	
OS	Nancy Ander, Deputy Director, Sustainability Glenn Connor – Clean Energy Program Manager

Monitoring Based Commissioning (MBCx)	
OS	Valerie Keisler, Energy Savings Program Manager Sergey Makarenko, Project Director II

Financing	
OS	Nancy Ander, Deputy Director, Sustainability Valerie Keisler, Energy Savings Program Manager

Water Efficiency and Conservation

Indoor Water Efficiency Projects In Progress First initiative	
FMD	Kathy Park, Associate Landscape Architect Jemahl Ämen, Deputy Director

Boilers and Cooling Systems Projects In Progress	
FMD	Jemahl Ämen, Deputy Director

Landscaping Hardware Water Efficiency Projects In Progress	
FMD	Kathy Park, Associate Landscape Architect Jemahl Ämen, Deputy Director

Living Landscaping Water Efficiency Projects In Progress	
FMD	Kathy Park, Associate Landscape Architect Jemahl Ämen, Deputy Director

Buildings with Urban Water Shortage Contingency Plans In Progress	
FMD	Kathy Park, Associate Landscape Architect Jemahl Ämen, Deputy Director

Green Operations

Greenhouse Gas Emissions	
OS	Nancy Ander, Deputy Director Dan Burgoyne, Program Manager

Building Design and Construction	
PMDB	Jason Kenney, Deputy Director Tom Wells, Principal Architect.

LEED for Existing Buildings Operations and Maintenance	
OS	Nancy Ander, Deputy Director Dan Burgoyne, Program Manager

Indoor Environmental Quality	
FMD	Bridget Peri, Sustainability Project Lead

Integrated Pest Management	
FMD	Bridget Peri, Sustainability Project Lead

Environmentally Preferable Purchasing	
OBAS	Jaime Tovar, Staff Services Manager II

Location Efficiency	
AMB	Patrick Foster, Assistant Branch Chief

Greenhouse Gas Emissions	
OS	Nancy Ander, Deputy Director Dan Burgoyne, Program Manager

Building Design and Construction	
PMDB	Jason Kenney, Deputy Director Tom Wells, Principal Architect

LEED for Existing Buildings Operations and Maintenance	
OS	Nancy Ander, Deputy Director Dan Burgoyne, Program Manager

Indoor Environmental Quality	
FMD	Bridget Peri, Sustainability Project Lead

Integrated Pest Management	
FMD	Bridget Peri, Sustainability Project Lead

Environmentally Preferable Purchasing	
OBAS	Jaime Tovar, Staff Services Manager II

Location Efficiency	
AMB	Patrick Foster, Assistant Branch Chief