Sustainability Roadmap 2018-2019: Energy

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

Department of Motor Vehicles

Edmund G. Brown Jr. Governor

December 2017

Department Name
Sustainability Roadmap 2018-2019:
Energy

James S. Derby
Departmental Construction and Maintenance Supervisor, Facilities Operations Branch

Sjon Woodlyn
Chief, Facilities Operations Branch

Jean Shiomoto
Director

TABLE OF CONTENTS

LIST OF TABLES

Acronyms

ADR	Automated Demand Response
CA	California
CALGREEN	California Green Building Code (Title 24, Part 11)
CEC	California Energy Commission
DGS	Department of General Services
EMS	Energy Management System (a.k.a., EMCS)
EMCS	Energy Management Control System (a.k.a., EMS)
ESCO	Energy Services Company
EO	Executive Order
EPP	Environmentally Preferable Purchasing
EUI	Energy Use Intensity (source kBTU/sq. ft.)
EVSE	Electric Vehicle Supply Equipment (charging equipment)
GHGe	Greenhouse Gas Emissions
GS $Mart	Golden State Financial Marketplace
HVAC	Heating Ventilation & Air Conditioning
IEQ	Indoor Environmental Quality
kBTU	Thousand British Thermal Units (unit of energy)
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental Design
MM	Management Memo
OBF	On-Bill Financing
PPA	Power Purchase Agreement
PUE	Power Usage Effectiveness
SAM	State Administrative Manual
SCM	State Contracting Manual
SMUD	Sacramento Municipal Utility District
USGBC	United States Green Building Council
ZEV	Zero Emission Vehicle
ZNE	Zero Net Energy

EXECUTIVE SUMMARY

DEPARTMENT OF MOTOR VEHICLES (DMV)

Mission

DMV proudly serves the public by licensing drivers, registering vehicles, securing identities, and regulating the motor vehicle industry.

Vision

A trusted leader in delivering innovative DMV services.

DMV Building Portfolio - Overview

The majority of DMV's customer services and programs are administered at field offices located throughout the state. The building portfolio consists of both state-owned and leased facilities. The most familiar of these is the traditional public field office, which comprises approximately 51% of the department's portfolio based on square footage. Another 14% is divided among Industry Business Centers, Call Centers, Commercial Driver License, Driver Safety, Investigations, Occupational Licensing, and Training offices. Often these separate programs are co-located in the same facility as a public field office. The balance of DMV's portfolio includes headquarters, warehouse/storage, and support facilities.

Nearly 50% of the department's facilities are state-owned by DMV, the California Highway Patrol (CHP), or the Department of General Services (DGS), and 62% of the state-owned facilities were built during, or prior, to 1980. With a state-owned portfolio that averages approximately 40 years in age, these aged buildings are in need of replacement or reconfiguration to meet the department's ongoing and diverse programmatic needs and to address code deficiencies.

Below is a chart showing an inventory of buildings and sites by ownership that DMV occupies.

DMV INVENTORY BY OWNERSHIP		
Building/Site Ownership	**Number of Buildings/Sites**	**Square Footage**
DMV Owned	100	1,565,444
DMV Leased	139	1,210,707
CHP Owned	6	10,770
DGS Owned	4	17,716
Totals	**249**	**2,804,673**

DMV Energy Conservation - Overview

DMV operates 249 buildings in its portfolio. The department is committed to implementing environmentally friendly, energy and resource-efficient practices and policies. Two of DMV's guiding principles illustrate the department's commitment to "Greening DMV" through its environmentally sound building designs and construction methods:

- Principle 6 – Utilize energy efficient and sustainable building design and construction methods that are in accordance with Executive Orders issued by the Governor, State of California's Green Building Action Plan, the California Green Building Standards Code, and the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system.
- Principle 7 – Remain committed to environmentally friendly and energy and resource-efficient practices and policies for both the buildings the department owns or operates and for the products DMV purchases.

DMV continues to work diligently in adopting green practices and policies by incorporating green principles into the department's existing facilities and proposed infrastructure projects.

Challenges and Efforts Underway

Authorized capital outlay projects are DMV's best opportunity to achieve significant energy efficiency improvements in field offices. New DMV field offices are designed to modern building codes which meet energy efficiency policy directives and incorporate new technologies for energy savings.

DMV has 89 state-owned field offices that were built prior to 1997 and have an average age of over 40 years. Sixteen of these buildings are over 50+ years old. These buildings suffer from physical and functional deficiencies and many have original mechanical systems, components and controls that cannot be updated without a complete system replacement. Most of these buildings do not have true energy management systems due to their age.

DMV has been successful in constructing and leasing 21 LEED certified buildings. DMV will continue implementing energy efficiency projects where feasible, including exploring potential funding from utility companies, Energy Services Companies (ESCO), Golden State Financial Marketplace (G$ Mart), etc. DMV and DGS successfully built the State's first zero net energy (ZNE) field office (Fresno) and DMV has six authorized ZNE field office replacement projects in various stages of design and construction. DMV has also improved energy efficiency through lighting retrofit projects (interior and parking lot lighting) and has implemented automated demand response (DR) projects at facilities that have sufficient infrastructure and building controls. As older HVAC equipment, controls and energy management systems are replaced, DMV upgraded to more energy efficient systems and may be able to expand its participation in DR programs. Roof replacement and re-roofing projects also present opportunities for improving insulation and the use of cool roof technologies to reduce energy use.

Jean Shiomoto
Director

SUSTAINABILITY GOALS

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

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

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

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 onsite renewable energy when feasible, implementing environmentally preferable purchasing, and developing the infrastructure for electric vehicle charging stations at state facilities. The Green Building Action Plan also established two oversight groups; the staff level Sustainability Working Group and the executive level Sustainability Task Force, to ensure these measures are met.

Executive Order B-30-15

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

State Administrative Manual & Management Memos

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

- SAM Chapter 1800: Sustainability
    - Section 1805 provides policy and guidelines regarding efficient energy management in state buildings during normal operations.
    - Section 1810 provides information regarding actions state agencies shall take to control energy usage during electrical emergencies. This includes Stage 1, 2 and 3 CAISO alerts, rotating power outages and blackouts.
    - Section 1815announces policy and guidelines for all state agencies to reduce and report energy use during normal operations.
    - Section 1820 provides direction to all state agencies under the Governor's executive authority to meet data center and server room energy efficiencies as required in the Green Building Action Plan, Section 10.7.
    - Section 1821 provides state building and facility managers with practices and procedures that will help them achieve operational efficiencies and resource conservation measures for:
        - Integrated Pest Management (IPM)
        - Drought Moratorium
        - Landscaping Practices
        - Maintenance of Building Exteriors, Roofs, Hardscape, and Exterior Painting
    - Section 1825 announces policy and provides direction to state agencies that build, lease and operate state buildings, on reducing indoor pollutant levels and ensuring healthful indoor environments for occupants in new, renovated, leased, and existing state buildings, as directed in Executive Order B-18-12.
    - Section 1835 provides direction to all state agencies under the Governor's executive authority on meeting the water use reduction requirements outlined in Executive Order B-18-12.
    - Sections 1840-1850 provide direction on recycling, waste diversion, purchasing recycled products and environmentally preferred purchasing.
- MM 15-06: State Buildings and Grounds Maintenance and Operation
- MM 15-04: Energy Use Reduction for New, Existing, and Leased Buildings
- MM 15-03: Minimum Fuel Economy Standards Policy
- MM 14-05: Indoor Environmental Quality: New, Renovated, And Existing Buildings
- MM 14-07: Standard Operating Procedures For Energy Management In State Buildings
- MM 14-09: Energy Efficiency in Data Centers and Server Rooms

ENERGY REPORT

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

Department Mission and Built Infrastructure

The DMV is a recognized leader among state agencies for energy and resource conservation strategies to meet objectives stated in the Governor's Executive Orders (EO) B-18-12 and B-16-12, and B-30-15. This progress plan describes current steps DMV is taking to achieve those objectives, targets, and requirements, as they apply to ongoing energy conservation measures in use at DMV facilities statewide.

Mission

DMV proudly serves the public by licensing drivers, registering vehicles, securing identities, and regulating the motor vehicle industry.

Vision

A trusted leader in delivering innovative DMV services.

DMV Building Portfolio - Overview

The majority of DMV's customer services and programs are administered at field offices located throughout the state. The building portfolio consists of both state-owned and leased facilities. The most familiar of these is the traditional public field office, which comprises approximately 51% of the department's portfolio based on square footage. Another 14% is divided among Industry Business Centers, Call Centers, Commercial Driver License, Driver Safety, Investigations, Occupational Licensing, and Training offices. Often these separate programs are co-located in the same facility as a public field office. The balance of DMV's portfolio includes headquarters, warehouse/storage, and support facilities.

Nearly 50% of the department's facilities are state-owned by DMV, the California Highway Patrol (CHP), or the Department of General Services (DGS), and 62% of the state-owned facilities were built during, or prior, to 1980. With a state-owned portfolio that averages approximately 40 years in age, these aged buildings are in need of replacement or reconfiguration to meet the department's ongoing and diverse programmatic needs and to address code deficiencies.

Below is a chart showing an inventory of buildings and sites by ownership that DMV occupies.

DMV INVENTORY BY OWNERSHIP		
Building/Site Ownership	**Number of Buildings/Sites**	**Square Footage**
DMV Owned	100	1,565,444
DMV Leased	139	1,210,707
CHP Owned	6	10,770
DGS Owned	4	17,716
Totals	**249**	**2,804,673**

Table 1: Total Purchased Energy YEAR

Purchased Utility	Quantity	Cost ($)
Electricity	24,092,564 kWh	$ 4,462,017
Natural Gas	421,012 Therms	$ 135,668
Propane	0 Gallons	$ 00
TOTAL COST	---	$ 4,597,685

Table 2: Properties with Largest Energy Consumption

Building Name	Floor Area (ft^2)	Site Energy (kBTU)	Source EUI (kBTU/ft^2-yr)
DMV Headquarters - East Building	371,709	112,139,432	302
Los Angeles Office Building	31,811	34,225,378	1076
West Covina Office Building	18,780	6,159,604	328
Hayward Office Building	10,057	5,344,286	531
San Francisco Office Building	29,119	5,184,853	178
Total for Buildings in This Table	461,476 ft^2	156,030,056 kBTU	338
Total for All Department (Owned) Buildings	*1,567,532 ft^2	**329,402,331 kBTU	210
% of Totals	29 %	48 %	%

*Square foot totals derived from the DMV 5 year infrastructure Plan

** KBTU total were derived from the DMV Facility Data Workbook

Challenges to Meeting Energy Efficiency Goals

Fiscal and Budgetary Challenges

Replacement field office projects provide excellent opportunities to design and construct to current building code, to meet policy directives (including ZNE) and to incorporate new technologies for energy efficiency into the buildings. DMV's other 89 state owned field offices have an average age of 40+ years, with 16 over 50 years old. Many of these buildings have original mechanical systems and energy management systems that cannot be updated without a complete system replacement, which can cost hundreds of thousands of dollars per project.

DMV has been successful in constructing and leasing LEED certified buildings. One of the department's most notable accomplishments was the completion of the State's first ZNE field office (Fresno); DMV has six additional authorized ZNE field office replacement projects that are currently in various stages of design and construction. DMV's 5-Year Infrastructure Plan also proposes renovation projects for older, existing field offices, with approximately three renovation projects per annum. The scope of work at each facility would be based on the original construction, age and condition of the building. Items that could improve energy efficiency include lighting retrofits, updated HVAC equipment and new roofs.

DMV has also sought opportunities to improve energy efficiency through lighting retrofit projects, such as interior and parking lot lighting, and has implemented automated demand response projects at facilities that have sufficient infrastructure and building controls. As older HVAC equipment, controls and energy management systems are replaced, DMV upgrades to more energy efficient systems. Roof replacement and re-roofing projects have also presented opportunities for improving insulation and the use of cool roof technologies.

All future DMV facility replacement and major renovation projects will be designed and built to the 2016 California Green Building Code and related policy directives. ZNE building solutions will be proposed by DMV for all new construction projects and additional energy conservation measures may include renewable energy solutions and monitoring based commissioning. DMV also employs an ongoing community awareness campaign to inform California citizens of different ways to conduct their DMV business, including online and at business service centers.

DMV remains committed to serving the public with a goal of limiting field office closures due to repair and maintenance projects. DMV will also continue to investigate and utilize alternative funding when available, including rebates and funding from utility companies, ESCOs, G$ Mart, etc.

Zero Net Energy (ZNE)

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

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

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

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

The DMV is proud to be the first California state department to achieve a ZNE building project with the 20,640 gross square foot (GSF) Fresno field office completed in 2014. This building has been validated ZNE based on 12 months of energy use data and on-site energy generation data.

The Grass Valley field office project (7,584 GSF) is scheduled for completion in late January 2018 and will be DMV's second ZNE building. DMV has five more authorized field office replacement projects, all of which are anticipated to be ZNE and their status is presented below:

- Inglewood – Working Drawing Phase – 15,644 GSF
- Santa Maria – Site Acquisition Phase – 13,342 GSF
- Delano – Site Acquisition Phase – 10,718 GSF
- San Diego – Environmental Review Phase and early Design – 18,540 GSF
- Reedley – Beginning of Site Identification Phase – 13,701 GSF

DMV currently operates 1.58 million square feet of agency owned buildings and has proposed that all future replacement and major renovation projects be authorized, designed and constructed as ZNE facilities. DMV's existing portfolio averages over 40 years in age and absent a full renovation project, such buildings cannot be retrofitted to achieve ZNE.; therefore, DMV's efforts to achieve a 50% ZNE portfolio will hinge largely on authorization and funding for new buildings, including new construction projects at DMV's existing headquarters campus.

Table 3: Zero Net Energy Buildings

Status of ZNE Buildings	Number of Buildings	Floor Area (ft^2)
Under Construction or Completed	2	28,224
Site Acquisition or Design Phase	5	71,945
Building Proposed for Before 2025 (but not yet in design)	8	747, 603
Totals for ZNE Buildings	13	847,772
Totals for Current Department Buildings	100	1,567,532
% ZNE	22%*	35%*

*Replacement projects on existing DMV sites may change the percentages estimated in Table 3

New Construction Exceeds Title 24 by 15%

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

Table 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	20,640
Under Design or Construction	5	79,529
Proposed Before 2025	8	747, 603

DMV has completed one new field office construction project (Fresno) since 2012, excluding the 12-year phased renovation project for DMV's Headquarters (HQ) Building East, which was completed in 2012. All new DMV building projects and major renovations beginning design after July 1, 2012, have been and will be overseen by DGS. The projects will be designed to exceed the current California Code of Regulations (CCR) Title 24, energy requirements by 15% or better. The Grass Valley field office project and the Inglewood field office project have already been designed to exceed Title 24 by over 15% and both will be at minimum LEED-Silver and ZNE.

Because DMV is proposing all its field office replacement projects and major renovation projects as ZNE facilities, Table 3 (above) essentially contains DMV's plans to achieve both ZNE and the 15% or more goal for Title 24. All future replacement and major renovation projects will also achieve LEED-Silver or better.

Reduce Grid-Based Energy Purchased by 20% by 2018

Executive Order B-18-12 requires state agencies to reduce grid-based energy purchased by 20% by 2018, compared with a 2003 baseline. Since 2003, DMV has reduced its Grid-Based energy purchased by 24%, as compared to 2016. Between 2015 and 2016, DMV reduced its statewide energy consumption by 2.23% and has completed the EO's 2018 goal ahead of schedule. DMV is committed to ongoing reductions in grid-based electrical purchases and is taking several steps to reduce energy impacts within the communities served.

The following energy conservation measures are in place, being implemented or considered:

- Energy management systems and improved controls are installed in all new DMV facility projects, where feasible and in older facilities as part of major renovations having full HVAC replacements. Additional efforts to reduce energy use include, but are not limited to:
    - Remote and locally controlled HVAC management systems, using state of the art energy management software to achieve the mandated +2/-2 temperature thresholds.
    - Using economizers and free outside air for cooling and heating. The HQ Building East and West mechanical systems are controlled by an Energy Management System that utilizes outside air (free cooling and heating) to control inside air temperatures through economizers. The outside air dampers are normally set at

approximately 15%; however, they can become fully opened if the demand suddenly increases, for building air flushes and whenever the outside air will provide free cooling or heating. Building East was recently renovated and its mechanical system and controls are equipped with features not contained within Building West, which has not been renovated since its original 1953 construction. HQ Building South, built in 1963, has a mechanical system that is operated manually. The South building is slated for eventual replacement and its older HVAC system does not lend itself to modern building energy system technologies, absent a complete and cost prohibitive, HVAC replacement.

- Lighting controls on interior lighting and electronic timers for parking lots and exterior lighting (other than security lighting).
- Installing Light Emitting Diode (LED) lighting in all new construction projects as required by current code, major renovation projects, and individual lighting retrofit projects in field offices and the HQ campus, based on life-cycle replacements.
- Increased indoor air quality goals are achieved through periodic scheduled maintenance of the building's HVAC systems performed by DGS and DMV stationary engineers, consistent with DGS' Management Memos and industry standards.
- Energy saving "sleep" mode on all departmental computer systems ranging from 1-30 minutes, utilizing Windows Operating Systems; set by global policy. Energy saving strategies are implemented by DMV's Information Systems Division and branch PC Coordinators.
- DMV purchasing policies require statewide Energy Star rated equipment purchase of all appliances, vending machines, computers, servers, etc. DMV does not have vending machines in public service areas at its field offices. Approximately 20 vending machines are within the DMV HQ campus and they are all Energy Star rated.
- DMV sends semi-annual notifications to all employees regarding policies designed to reduce energy waste. Existing policy limits the use of small appliances, fans coffee makers, etc. Legally required reasonable accommodations are exempt from energy reduction policies. One frequently occurring accommodation is de-lamping, which actually reduces energy use.
- DMV-operated data centers over 200 square feet comply with ASHRAE-TC 9.9, Class A1-A4 guidelines. Maximum temperatures between 73-81degrees are mandated by Management Memo 14-09
- All state-owned data centers over 1,000 square feet with a power usage effectiveness (PUE) above 1.5 must reduce their PUE by a minimum of 10 percent per year until they achieve a PUE of 1.5 or lower. DMV operates 2 data centers over 1000 square feet:
    - Sacramento HQ-East Building (PUE 1.75)

- Sacramento HQ 28th & Broadway (PUE 1.33)

DMV utilizes the Department of Technology provided online spreadsheet to report PUE as required by EO. DMV is continually working to identify and implement strategies to improve data center efficiencies.

- All purchases of DMV network switches and routers meet the Energy Efficient Ethernet IEEE 802.3-2012 Section 6 standard
- Regulated hot water systems, including the installation of tankless water heaters and instant hot water systems, are implemented in replacement, renovations and leasing projects, where feasible
- State of California stationary engineers and authorized service providers maintain DMV-owned buildings that have a central plant, primarily the DMV HQ campus, with large boiler units. DMV has a 2-year maintenance agreement with an authorized service vendor to tune-up DMV's boilers at factory specified intervals, and ensures that operation at peak efficiency. The great percentage of DMV's portfolio consist of small field office buildings, which do not utilize boiler units.

Table 5: Department Wide Energy Trends

Year	Floor Area (ft^2)	Total kBTU Consumption	Department Average EUI
Baseline Year	1,549,302	179,109,941	116
2012	1,563,007	149,340,224	96
2013	1,561,794	157,182,224	100
2014	1,572,347	132,824,948	84
2015	1,568,827	137,659,324	88
2016	1,567,532	138,588,872	88
2018 Goal	1,567,532	143,287,953	91 (-22%)

As of December 2016, DMV has exceeded the Governor's 2018 goal of 20% grid based energy reductions based on the baseline year. DMV has increased its total square footage since 2003, yet has reduced its statewide energy use intensity (EUI) through ongoing energy conservation measures taken during the construction of new, leased space and renovated facilities. DMV has 100 state-owned buildings, 88 of which are small field offices. With such a huge portfolio of small facilities, it is not feasible to report each building's individual EUI score, perform analysis, and develop unique strategies for improvement. DMV's priority is to maintain facility operability, avoid building closures, and serve its customers.

DMV's field office replacement and major renovation strategy will address many of its oldest and inefficient buildings. Scheduled lifecycle maintenance and repair projects, including lighting and HVAC replacements, will also improve energy efficiency. DMV will continue to explore opportunities to use utility rebates and alternative funding for energy projects.

Table 6: Energy Reductions Achieved

Purchased Energy Compared to Baseline	Number of Buildings	Floor Area (ft^2)	Current Year Energy Use	Percent of Total Energy
2003 Baseline	92	1,573,710	179,109,941	100%
2016 Energy Data	100	1,397,687	134,588,872	100%
Totals	+8	-9%	-24%	
Department-Wide Reduction				

DMV has always been committed to conserving resources in the communities it serves. Prior to the baseline year of 2003, DMV sought to reduce energy, water, natural gas, and other fuel consumption to operate and maintain its considerable building portfolio. Since 2006 DMV has achieved or taken occupancy in 21 LEED certified buildings (state owned and leased), and currently has five more seeking LEED certification. DMV also owns one ZNE building (Fresno), an additional ZNE building is scheduled for completion in late February 2018 (Grass Valley), and five authorized ZNE field office replacement projects are in design/pre-construction. DMV's HQ East Building will begin a fluorescent light retrofit project in 2019 based on a life-cycle replacement schedule, with full conversion to LEDs. This HQ lighting retrofit is a large project that will likely lend itself to alternative funding sources. DMV will be coordinating with DGS in the implementation of this project.

Table 7: Summary of Energy Projects Completed or In Progress

Year Funded	Energy Saved (kBTU/yr.)	Floor Area Retrofit (ft^2)	Percent of Department Floor Area
2012-2016	Specific data not available for this table see summary below.	Specific data not available for this table see summary below.	Specific data not available for this table see summary below.

DMV conducts annual assessments of its entire building portfolio to determine outstanding space deficiencies, periodical maintenance requirements, and overall condition of its facilities. The assessment data, captured in the DMV 5-Year Infrastructure plan and the 5-Year Maintenance Plan, includes projects to replace various building systems that will provide energy conservation measures. DMV has thirteen HVAC replacement projects in various stages of

design and construction and two more beginning in FY 17-18. Fourteen parking lot lighting retrofit projects are scheduled this year and twelve roofing projects are in various stages of design and construction. Each of these projects will improve the energy efficiency of the buildings, however, there are no engineering calculations that identify anticipated savings by location.

Last year, DMV investigated the installation of Electric Vehicle Supply Equipment (EVSE) at six field offices located in high population areas. Surveys were performed by EVGo, and upon completion, DMV met with the EVGo representative to review total project costs, incentives and subsidies, site impacts, project delivery requirements, and long-term costs. The parties also discussed contracting requirements, cost recovery processes, and operational impacts to DMV's field offices. Due to much higher than expected costs, operational impacts and vendor contracting requirements, no EVSE installations were feasible under EVGo's program. DMV also investigated two utility incentive programs through Southern California Edison and San Diego Gas and Electric, but DMV did not meet their program requirements. Despite these initial challenges, DMV will continue investigating opportunities for EVSE installations and implementation of other energy conservation projects.

Table 8: 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
2012	N/A	N/A	N/A	N/A	N/A
2013	N/A	N/A	N/A	N/A	N/A
2014	N/A	N/A	N/A	N/A	N/A
2015	N/A	N/A	N/A	N/A	N/A
2016	N/A	N/A	N/A	N/A	N/A

DMV has not completed formal ASHRQE surveys for any facilities, therefore Table 8 shows N/A in all fields. DMV is developing a strategy to conduct ASHRAE Level 1-2 surveys in the future, pending funding. Due to the large number of DMV buildings, facilities having the greatest deficiencies or those where retrofit projects would create the least disruption customer service, may be the first buildings surveyed.

In July of 2015, Southern California Edison and First Fuel completed two Rapid Building Assessments on DMV's Bellflower and Whittier field offices to identify annual electric use consumption by category (ex. HVAC, lighting, plug load, ventilation, pumps) and recognize opportunities for improvement. The assessment determined that DMV's lighting typically consumes over a third of the facility's total electricity use (36% in Whittier and 44% in Bellflower). The next largest electricity use component was for HVAC/cooling. DMV includes lighting retrofit and HVAC replacement within its scheduled maintenance and repair plans. The

department is very aware of its energy use profile and will continue pursuing opportunities for energy use reductions as funding allows.

Demand Response

Executive Order B-18-12 directed all state departments to participate in available demand response (DR) programs and to obtain financial incentives for reducing peak electrical loads when called upon, to the maximum where feasible. DMV participates in DR with the San Diego Gas and Electric Company (SDG&E), for six of its field offices. In addition, DMV participates in DR with the Sacramento Municipal Utility District (SMUD) for its headquarters campus in Sacramento. DMV has not experienced any negative experiences with either program, and is exploring other DR programs with utility providers statewide. DMV does have potential challenges in implementing additional DR programs:

- Many of DMV's field offices and HQ (Buildings West and South) have mechanical systems and controls that are over 40 years old, are functionally obsolete, and cannot interface with DR program infrastructure.
- DMV's IT safety and security protocols are designed to protect confidential, secure information, but this can limit the use of DR systems that need connectivity to DMV's energy management systems.
- Contractual language required by some utilities has been in conflict with State's requirements.
- DMV's field offices were originally designed to serve a smaller number of building occupants than what DMV experiences today. The buildings' mechanical systems can be undersized for the current building occupants (staff and customers). Maintaining a reasonable temperature on hot days is a challenge for older HVAC systems and the prospect of DR, further exacerbates the challenge of cooling these older buildings.

Table 9: Demand Response

Demand Response Participation	Number of Buildings/Sites	Estimated Available Energy Reduction (kW)
Number of Existing Buildings Participating in 2016	7	200,000
Number of Buildings That Will Participate in 2017	7	200,000
All Department Buildings (Totals)	7	200,000
All Department Buildings (Percent)	7%	>1%

Renewable Energy

Pursuant to EO B-18-12, new or major renovated state buildings over 10,000 square feet must use clean, on-site power generation, and clean back-up power supplies, if economically feasible. Facilities with available open land must consider large scale distributed generation through various financing methods, including, but not limited to, third party power purchase agreements (PPAs). DMV field offices are typically small (less than 20,000 square feet), single story buildings with surface parking lots. With less site density and electrical use than a multi-story general-purpose state office building, it is possible to achieve ZNE through roof mounted and/or carport mounted solar arrays. DMV's Fresno field office project, completed in 2014, was the first ZNE state office building, and the Grass Valley field office, scheduled for completion in late February 2018, will be DMV's second ZNE facility. Five additional ZNE field office projects have been authorized for DMV and are in various stages of site acquisition and design. DMV is a leading state agency in developing ZNE facilities and will continue proposing new field office replacement projects as ZNE. While DMV will propose ZNE, the decision to authorize and fund new capital outlay projects to ZNE ultimately resides with the Governor and the Legislature through the budget process.

DMV currently has four photovoltaic solar arrays at offices statewide, including an array on the roof of the HQ East Building in Sacramento. DMV will continue to utilize renewable energy options where required by the California Green Building Code and in support of the Governor's EOs.

Table 10: On-Site Renewable Energy

Status	Number of Sites	Capacity (kW)	Estimated Annual Power Generation (kWh)
Renewables In Operation or Construction	5	1,135,259.38	9,944,868,840.
Renewables Authorized (in design)	4*	300,000	2,628,000,000
Renewables Proposed (5 Yr.)	8	600,000	5,200,000,000
Renewable Totals	17	1,495,259.38	15,772,868,840
Department Wide Totals	17	1,495,259.38	15,772,868,840
Department Wide Renewable Percent	17%	17%	17%

*Delano, Santa Maria, San Diego - Normal St., Reedley

Monitoring Based Commissioning (MBCx)

New and existing state buildings must incorporate Monitoring Based Commissioning (MBCx) to support cost effective and energy efficient building operations, using an Energy Management Control System (EMCS). State agencies managing state-owned buildings must pursue MBCx for all facilities over 5,000 square feet with EUIs exceeding thresholds described in Management Memo 15-04. DMV is continually improving Energy Management and Control Systems (EMCS) in its facilities, where feasible. The department has found that onsite staff understand the systems much better when training occurs as part of the MBCx, post installation, or at the completion of a new building construction projects. New construction and or major renovation projects will include MBCx and DMV will work with DGS architects, contractors, planners and inspectors to verify MBCx at all new projects.

Management Memo 15-04 also identifies MBCx goals for existing buildings. As previously mentioned, the majority of DMV field offices are more than 40 years old and have HVAC systems and controls that do not lend themselves to MBCx. The scope and cost of retrofits to allow MBCx in these older facilities is cost prohibitive and major retrofits to the mechanical systems would require lengthy office closures, which would impede DMV's ability to deliver services to the public. DMV's strategy for implementing MBCx will primarily be in new facility development. Projects designed after the issuance of MM 15-04 have been overseen by DGS and conform to all code and policy directives.

Table 11 identifies DMV's recently authorized projects where MBCX will be achieved. Two challenges associated with MCBx being implemented at DMV field offices are: 1) having a secure internet connection to allow the download of trend data; and 2) having energy management control systems with adequate storage for large quantities of trend data. In addition to new facility replacement projects, DMV will also work closely with DGS to evaluate any opportunities for MBCx in HVAC replacement projects.

Table 11: Planned MBCx Projects

Building	Location	Floor Area (ft^2)	EMCS Exists? (MBCx Capable, MBCx Difficult, No EMCS)	MBCx Projected To Start	Projected Cost ($)
Inglewood FO	Inglewood	15,644	MBCx Capable	2019	*
Delano FO	Delano	10,718	No EMCS	2021	*
Santa Maria FO	Santa Maria	13,342	MBCx Operational	20210	*
San Diego FO	San Diego	18,540	MBCx infeasible	2022	*
Reedley FO	Reedley	13,701	No EMCS	2022	*
Totals		71,945			

* MBCx costs are imbedded within the total project cost of these new capital outlay projects.

Financing

State agencies are required to investigate available financing and project delivery mechanisms to achieve goals, including, but not limited to: state revolving loan funds, grants, utility On-Bill Financing (OBF), Power Purchase Agreements (PPA), GS $Mart, and Energy Service Companies (ESCOs). Future large lighting retrofit projects, such as the DMV HQ East Building targeted for 2019, may lend themselves to OBF, ESCOs and/or other opportunities. When considering larger energy retrofit projects, DMV will consult with DGS' Office of Sustainability to scope and implement the most advantageous project alternative.

DMV has not utilized the PPA form of financing previously. DMV's existing solar arrays and associated infrastructure are state owned and have been part of the department's new capital outlay projects. Power Purchase Agreements are unlikely to be used at DMV's older field offices, as they require long-term lease commitments and many of these facilities are targeted for near-term replacement or major renovation.

DEPARTMENT STAKEHOLDERS

Zero Net Energy (ZNE)	
Sjon Woodlyn	Chief, Facilities Operations Branch
	.

New Construction Exceeds Title 24 by 15%	
Sjon Woodlyn	Chief, Facilities Operations Branch

Reduce Grid-Based Energy Purchased by 20% by 2018	
Sjon Woodlyn	Chief, Facilities Operations Branch

Demand Response	
James Derby	DCMS, Facilities Operations Branch

Renewable Energy	
James Derby	DCMS, Facilities Operations Branch

Monitoring Based Commissioning (MBCx)	
James Derby	DCMS, Facilities Operations Branch

Financing	
James Derby	DCMS, Facilities Operations Branch